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IN THE
Supreme Court of the United States

OCTOBER TERM, 1950

No. 565

RADIO CORPORATION OF AMERICA, NATIONAL BROADCASTING
COMPANY, INC., RCA VICTOR DISTRIBUTING CORPORA-
TION, ET AL., *Appellants,*

v.

THE UNITED STATES OF AMERICA, FEDERAL COMMUNICATIONS
COMMISSION, and COLUMBIA BROADCASTING SYSTEM, INC.

Appeal From the District Court of the United States for the
Northern District of Illinois, Eastern Division.

BRIEF FOR THE UNITED STATES, THE FEDERAL
COMMUNICATIONS COMMISSION, AND COLUM-
BIA BROADCASTING SYSTEM, INC.

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**BRIEF FOR THE UNITED STATES, THE FEDERAL
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OPINIONS BELOW.

The Order of the Federal Communications Commission
here in issue (R. 432) appears at 15 F. R. 7013. The re-
ports of the Federal Communications Commission (R. 95,

413) have not been officially reported, but appear in 1 Pike & Fischer, *Radio Regulation* (part 2), pp. 91:261 and 91:441. The opinions in the District Court of the United States for the Northern District of Illinois, Eastern Division (R. 863) have not yet been reported in the Federal Supplement but they appear in 6 Pike & Fischer, *Radio Regulation*, p. 2073.

JURISDICTION.

The judgment of the Court below (LaBuy, J., dissenting) was entered on December 22, 1950 (R. 863, 879). A petition for appeal therefrom was filed on January 25, 1951, and the appeal was allowed on the same day (R. 892). On March 5, 1951, this Court noted probable jurisdiction. The jurisdiction of this Court on this appeal rests on 28 U. S. C. 1253 and 2101(b).

QUESTIONS PRESENTED.

The Federal Communications Commission, after hearing, amended its "Standards of Good Engineering Practice" for television transmissions so as to authorize the regular non-experimental broadcasting of color television under the field sequential system. The questions presented are:

1. Whether the decision of the Federal Communications Commission that the field sequential system of color television is suitable and the dot sequential system not suitable for regular non-experimental broadcasting, is reasonable.

2. Whether the Federal Communications Commission considered all evidence properly presented in reaching its determination to adopt standards for color television based on the field sequential system, and whether the conduct of the hearings was in all other respects in conformity with law.¹

¹ An incidental question presented is whether the court below properly quashed subpoenas *duces tecum* requested by Pilot Radio Corporation. This matter is briefly discussed *infra*, pp. 149-151.

STATUTE INVOLVED.

The pertinent provisions of the Communications Act of 1934, 48 Stat. 1064, as amended, 47 U. S. C. 151, *et seq.* (hereinafter referred to as the "Communications Act") are printed in the Appendix A, *infra*, pp. 153-155.

STATEMENT.

This suit was brought on October 17, 1950, to set aside the Federal Communications Commission's order (15 F. R. 7013; R. 432), adopted October 10, 1950, and effective November 20, 1950, establishing engineering standards for color television transmissions.

The original plaintiffs were Radio Corporation of America (herein called "RCA"), and two of its wholly-owned subsidiaries, National Broadcasting Company, Inc. (herein called "NBC") and RCA Victor Distributing Corporation (herein called Distributing Corporation). RCA is engaged in the manufacture of black and white television equipment, including receivers (R. 2, 3). It is also engaged in research and development work in the field of television and was the proponent of a color system known as the RCA or dot sequential system (R. 6). NBC is engaged, among other things, in black and white television broadcasting, including such broadcasting on a network basis (R. 2). Distributing Corporation is engaged in the sale of black and white television receivers manufactured by RCA to dealers located in Chicago and other mid-western cities (R. 2, 3).

Over the objections of appellees, the following parties (herein collectively referred to as "intervenor-appellants") were permitted to intervene (R. 864): Emerson Radio and Phonograph Corporation, Pilot Radio Corporation, The Radio Craftsmen, Incorporated, and Wells-Gardner & Co.,—each a manufacturer of black and white television receivers and equipment (R. 536, 450, 528,

493); Sightmaster Corporation, which alleged it had been a manufacturer of black and white television receivers (R. 519); Local 1031, International Brotherhood of Electrical Workers, AFL, a labor organization whose members are employed by manufacturers of television receivers, parts and equipment in the Chicago area (R. 545-6); and Television Installation Service Association, a trade association of companies engaged in the installation and servicing of television receivers in the Chicago area (R. 505).

Columbia Broadcasting System, Inc. (herein referred to as "CBS") was, without objection, permitted to intervene as a defendant (R. 486). CBS is not a manufacturer of television receivers or equipment, but it is engaged in black and white television broadcasting, including such broadcasting on a network basis. It is also engaged in research and development in the field of color television and was the proponent of a color system known as the CBS or field sequential system. (R. 485.)

The complaint alleged in substance that the order of the Federal Communications Commission (hereinafter called "the Commission") is illegal under the Communications Act of 1934, is arbitrary, unreasonable, unconstitutional, and unsupported by substantial evidence, and that it was vitiated by improper procedures (R. 13).

On October 27, 1950, the Government and CBS filed motions to dismiss the complaint or, in the alternative, for summary judgment (R. 437, 490). The court below (La-Buy, J., dissenting) granted the motions and dismissed the complaint (R. 863). At the same time, however, the District Court on its own motion also continued in force until April 1, 1951, or until terminated by this Court, a temporary restraining order which the District Court had granted previously (R. 882).

A. The Commission's order. The Commission's order amended its Standards of Good Engineering Practice by

adopting engineering standards for color television transmissions (R. 432).² The order did not require any broadcaster to broadcast color television. Its only effect was to provide that if a licensed broadcaster chooses to broadcast color television on a regular non-experimental basis, the signals transmitted must conform to the technical engineering standards adopted by the Commission.

B. The proceedings before the Commission. The Commission proceedings culminating in the order adopting standards for color television broadcasting³ may be summarized as follows:

On July 11, 1949, the Commission issued, as a part of a larger proceeding the other phases of which are not immediately relevant herein, a Notice of Further Proposed Rule Making (R. 16; 14 F. R. 4483). This notice invited proposals for a change in existing transmission standards looking toward the inception of color television service and

² Until such standards are set for a particular broadcast service—whether radio, black and white television, or color television—there can be no regular broadcasting of that service. Unless standards, prescribing the engineering characteristics of the signal to be transmitted, are first set by the Commission, each licensed broadcaster would be free to transmit whatever type of signal he chooses, regardless of its interfering effect on other radio stations and regardless of the capabilities of the signal in producing a satisfactory quality of sound or picture on home receivers. In addition, those who wish to receive broadcasts would either be required to purchase a different receiver for each different type of signal broadcast, or they would be able to receive only those signals which their particular receivers were fitted to receive. Accordingly, the Commission has always established a single set of transmission standards for each particular service (AM radio, FM radio, and black and white television) in order to avoid such interference and to assure that members of the public will receive a uniform satisfactory service. See "Report of the Commission" (mimeo. 5466), March 18, 1947, 11 F. C. C. 1523. See also *infra*, pp. 103-111.

³ In 1941, the Commission had adopted standards for the regular non-experimental broadcasting of black and white television. See First Report, Par. 8, R. 102-4.

described the conditions upon which proposals would be considered; it also invited comments from any interested persons who wished to participate in the color television phase of the hearing.

Pursuant to the notice of July 11, 1949, nine organizations or individuals filed comments within the time prescribed; eight of them participated in the hearing as parties (First Report, Par. 23, R. 112). None of the intervenor-appellants filed such comments or participated in the hearings. Only three parties proposed color television systems for consideration: RCA proposed a dot sequential system, Color Television, Inc. (herein referred to as "CTI"), proposed a line sequential system, and CBS proposed a field sequential system (R. 112-3).

The hearing on the color television issues was held before the Commission *en banc* beginning on September 26, 1949, and ending May 26, 1950—consuming a total of 62 hearing days and covering 9,717 pages of transcript. The hearing was held in two phases, the first of which began on September 26 and ended on November 22, 1949, and the second of which began on February 20, and ended on May 26, 1950. During the intervening period, the proponents and certain other parties conducted field tests of color television systems pursuant to the Commission's "Notice Concerning Field Test Programs and Further Testimony" (Tr. 885; First Report, Par. 24, R. 113).

In all, 53 witnesses testified and 365 exhibits were received (R. 113). All testimony was under oath and subject to cross-examination. During the hearings, in addition, eight demonstrations were conducted on the record: CBS demonstrated its system on October 6 and 7, 1949, and certain new developments on April 26, 1950; RCA demonstrated its system on October 10, 1949, and certain new developments on April 6, 1950; CTI demonstrated its system on February 20 and May 17, 1950. On November 21 and 22, 1949, comparative demonstrations were conducted showing the operation, side-by-side, of standard black and white television, the RCA color system

and the CBS color system. On February 23, 1950, similar comparative demonstrations were conducted of the RCA, CTI and CBS color systems (R. 114).

Pursuant to the Commission's Notice of May 10, 1950, the parties were permitted to file Proposed Findings and Conclusions, and replies thereto, after the close of the hearings. Such proposals and replies were submitted by RCA and CBS among others (R. 98; Tr. 15748, 15306, 15960, 15858).

On September 1, 1950, the Commission issued its First Report covering the color television issues (R. 95). On October 10, 1950, it issued its Second Report (R. 413). The findings and conclusions embodied in these reports are summarized in the next succeeding section.

C. The Commission's findings and conclusions. In the First Report, the Commission concluded that "color is an important improvement in television broadcasting. It adds both apparent definition and realism to pictures. It opens up whole new fields for effective broadcasting, rendering life-like and exciting scenes where color is of the essence—scenes which in black and white television are avoided or, if telecast, have little appeal" (R. 154-5). The Commission also made extensive and unanimous findings and conclusions evaluating the performance of each of the proposed color systems. The salient findings and conclusions (a tabular comparison of which is set out as Appendix B hereof, *infra*, pp. 156-158) concerning the RCA and CBS systems⁴ may be summarized as follows:⁵

⁴ The Commission also made findings and conclusions concerning the CTI system, on the basis of which it rejected the system as inadequate. CTI has not appealed the Commission's action and hence further reference to the CTI system is omitted.

⁵ In the following summary, findings and conclusions other than those which are purely descriptive and the subject-matter of which was not controverted at the hearing, are accompanied by references to those places in the record before the Commission which support the findings. The record before the Commission was filed with the court below in support of the appellees' motions to dismiss the complaint or in the alternative for summary judgment, and also

1. *The RCA dot sequential system.* The RCA color system is a dot sequential system; that is, the color information is picked up ("scanned") by the camera and transmitted picture element by picture element ("dot" by "dot"). This involves a color switching rate, or rate of changing among the three primary colors (red, blue and green), of about 11,000,000 times per second (R. 119, 123-6):

Flicker. No large area flicker was observable at any of the demonstrations. The RCA picture had very low illumination,⁶ however, and hence there was insufficient evidence whether the large area flicker characteristics of the RCA color pictures are the same as for black and white (R. 134). Small area flicker in the form of dot motion or twinkle was observable at the demonstrations on the record (R. 134); Tr. 5359, 9937 (T. T. Goldsmith);⁷ Tr. 9382, 9550 (DuMont); Tr. 3182, 6606, 9267, 9271, 11216, 11245-6 (Goldmark)). Because of the dimness of the RCA pictures, the seriousness of this problem cannot be entirely ascertained (R. 134).⁸

in opposition to appellants' motion for preliminary injunction (R. 445). This record has been certified to this Court as an original exhibit. On March 5, 1951, this Court granted a motion to dispense with the printing of this record, but pursuant to a stipulation between the parties which led to this motion, the parties may refer to it in their briefs. The administrative record is referred to hereafter as "Tr".

⁶ The perceptibility of flicker increases as brightness increases (R. 129).

⁷ Appendix A of the Commission's First Report (R. 171) lists the witnesses and the parties for whom they appeared.

⁸ Small area flicker may be minimized or overcome by the use of tubes with long persistence phosphors, although the use of phosphors may affect color fidelity and the portrayal of objects in motion (R. 134).

Phosphors are a chemical coating on the face of the receiving tube which are activated by the electron beam and thus produce the light which makes up the picture. Present tubes use "short persistence" phosphors—i. e., phosphors which become dark quickly after being activated. "Long persistence" phosphors retain light after activation for a longer period; hence they reduce flicker be-

Brightness. At none of the demonstrations on the record was the brightness of the RCA pictures sufficient for ordinary home use (R. 137; Tr. 3578-9, 9279-80, 9301-2 (Goldmark); Tr. 5222 (T. T. Goldsmith); Tr. 5566 (DuMont); Tr. 8460 (Chapin)). While equipment can be developed for the RCA system which will produce higher brightness, there is doubt, which can be resolved only by further testing, whether there is not a fundamental limitation, arising out of RCA's limited duty cycle, on its brightness potential (R. 137; Tr. 9279, 11228, 11257-8 (Goldmark)).

Contrast. The RCA system has difficulty in maintaining adequate contrast in its picture, particularly in fine detail (R. 137; Tr. 6606, 9293, 9301-3, 11206, 11213 (Goldmark); see also Tr. 9457-8 (DuMont); Tr. 10640 (Chapin)).

Registration. In the RCA system, registration⁹ is a severe problem both at the camera¹⁰ and receiver; misregistration was apparent at all RCA demonstrations on the record (R. 139-40; Tr. 3121-6, 3133-5, 3572-3, 11200-2, 11204, 11243-5 (Goldmark); Tr. 5090, 5217, 9921 (T. T. Goldsmith); Tr. 5566, 9377, 9380 (DuMont); Tr. 11480-1 (Lippincott); Tr. 8460 (Chapin)).

Color fidelity. At all of its demonstrations on the record, RCA had difficulty producing a picture with adequate

cause of the shorter periods of interim darkness when there is no activation by the electron beam as it passes back and forth on the tube face.

⁹ The registration problem arises from the fact that since color television involves the transmission of separate pictures in different colors, which are then combined into one color picture, it is necessary for the three separate pictures to have the same size and shape and they must appear to lie directly one over the other. Misregistration adversely affects both resolution (see *infra*, p. 10) and color fidelity. (R. 137)

¹⁰ The problem by its nature is far more difficult in the case of outdoor pickups (R. 140; Tr. 11202 (Goldmark); Tr. 11480 (Lippincott)). RCA, however, never demonstrated any outdoor pickup cameras (R. 140).

color fidelity¹¹ (R. 141; Tr. 3750-1, 3753, 3784-5, 9313 (Judd); Tr. 4765 (McIntosh); Tr. 5219, 5454-5, 9926 (T. T. Goldsmith); Tr. 5566 (DuMont); Tr. 3570-2, 8880-2, 9267-8, 9285-7, 11205-7, 11242-6 (Goldmark); Tr. 8610 (Stanton); Tr. 3803-4 (DuBarry); Tr. 5943, 5947-8, 5954, 6254 (Murphy); Tr. 8460 (Chapin)). This difficulty in maintaining adequate color fidelity arises from several factors which are part of the RCA system, including the problem of registration and the fact that a time error of only 1/11,000,000 of a second in the sampler results in the transmission or receiving of the wrong color (R. 141; Tr. 7392-3 (Jensen); Tr. 3153, 3155-7, 9267-8, 11205-6 (Goldmark); Tr. 4763-5 (McIntosh); CTI Ex. 273, Tr. 4817)).

Resolution. The geometric resolution¹² of the picture produced by the RCA system is not, even in theory, equal to that of the present black and white system for all types of scenes. Its horizontal resolution ranges between 67 per cent and 100 per cent of black and white, and in particular types of scenes, the horizontal resolution may be reduced to 33 per cent. (R. 143; Tr. 7395 (Jensen); FCC Ex. 302 (Tr. 6183), with which compare Tr. 6697-6701, 6705 (Plummer); Tr. 6605-6, 11218-9 (Goldmark); cf. Tr. 9931 (T. T. Goldsmith).) Further, RCA resolution has suffered from the misregistration which has been present at each of the demonstrations on the record¹³ (R. 143; see *supra*, p. 9).

¹¹ The Commission did note, however, that "Although there is some testimony that at times the color fidelity of the RCA picture was adequate, this was achieved either at a special demonstration not on the record or sporadically on the record" (R. 141). See *infra*, pp. 55-56.

¹² Geometric resolution is defined as "the number of lines which the system can provide"; it is one of the factors which enter into the "apparent definition" (i. e., sharpness and ability clearly to portray detail) of a television picture (R. 142).

¹³ If there is camera misregistration of only one of the three images in the camera by only one picture element (i. e., 2/1000ths of an inch) horizontally, and one line (i. e., 2/1000ths of an inch vertically), the geometric resolution of the picture may be decreased to less than half (Tr. 3121, 11201) (Goldmark).

Picture texture—Over-all picture quality (see R. 143). The RCA picture has a soft quality, probably because of difficulties in maintaining contrast, particularly in small areas (R. 144; see p. 9, *supra*; see Tr. 6606 (Goldmark)). RCA picture texture was also marred at all of the demonstrations on the record by the visibility of dot structure (R. 144; Tr. 9382 (DuMont); Tr. 5214, 9937-8 (T. T. Goldsmith); Tr. 8460-1, 8489-90 (Chapin); Tr. 3574, 3582, 3983-4, 6606, 11217 (Goldmark); Tr. 4781 (McIntosh)). The minimization of such structure may be possible, although no means to do so were demonstrated; such elimination is, however, likely to be at the expense of further loss in resolution or contrast, or in both (R. 144; Tr. 9232, 11217 (Goldmark); Tr. 10656 (Chapin); cf. Tr. 9937-8 (T. T. Goldsmith); Tr. 10753 (Brown)).

Susceptibility to interference. While in general, the RCA system has about the same susceptibility to interference as does the standard black and white system, it has a greater susceptibility to oscillator radiation (i.e., interfering signals transmitted by other television receivers, diathermy machines and other kinds of apparatus) than does the black and white television system (R. 145). The interference caused to the RCA system by oscillator radiation is severe and under certain conditions, upsets color synchronization so that color control is lost (R. 145-6; Tr. 8456, 8458-9, 11654 (Chapin); Tr. 8222, 8224-5, 8263-4 (D. B. Smith); FCC Ex. 389, Tr. 8491; FCC Ex. 465, Tr. 11653; RCA Ex. 425, Tr. 10761)).

Compatibility; quality of black and white pictures from color. The RCA system is compatible—that is, no change is required in existing black and white receivers to enable them to receive a black and white picture from RCA color transmissions (R. 149). The picture so received, however, is somewhat inferior to present black and white pictures received from standard black and white transmissions (R. 149; Tr. 5360, 5402, 5964, 9930 (T. T. Goldsmith); Tr. 5567, 9382 (DuMont); Tr. 11540-2 (Lippin-

cott); Tr. 6256 (Murphy); Tr. 4781 (McIntosh); Tr. 8491 (Chapin); Tr. 3182, 6606, 11208-9, 11217 (Goldmark); FCC Ex. 302, Tr. 6183).

*Convertibility.*¹⁴ No practical converter to enable existing black and white receivers to receive color pictures under the RCA system was demonstrated in the course of the hearings (R. 149; Tr. 8013 (Fink); Tr. 3404, 3450-1 (Goldmark); Tr. 6255 (Murphy); Tr. 5276 (T. T. Goldsmith); Tr. 11386 (Matthews); Tr. 6169-70, 6180, 7858-9 (Engstrom)).

Equipment considerations. At none of the demonstrations was a practical RCA home receiver shown. The receivers first demonstrated by RCA, utilizing dichroic mirrors and three kinescope tubes, were so bulky, complex and expensive, and their controls so critical, that they could not be seriously considered for home use. (R. 152; Tr. 7968 (Fink); Tr. 8459-61, 11657 (Chapin); Tr. 11512 (Lippincott); Tr. 3236, 3240, 8881, 9285, 11240-2, 11245, 11257 (Goldmark); Tr. 5090 (T. T. Goldsmith); Tr. 5566, 5660, 9377, 9380 (DuMont); see Tr. 2674-5, 6065, 7805 (Engstrom); RCA Ex. 309, Tr. 6183; RCA Ex. 316, Tr. 6577; cf. Tr. 5943-4 (demonstration).) On April 6, 1950, RCA demonstrated a receiver using a single tri-color tube (R. 152). Even at this demonstration, however, there was evidence of faulty registration, but it was uncertain whether this was due to the receiver or the camera or both (R. 152; Tr. 11201-2, 11203 (Goldmark)). Since color control is extremely critical in the RCA system, there can be no assurance that the fault does not exist at both ends (R. 152). In any event, since the tube was demonstrated toward the close of the hearings, had had very little field testing, and had not been made available either to the parties or to the Commission's laboratory, it is question-

¹⁴ "Convertibility" is the term applied to the capability, under a color system, of so altering existing types of receivers now in the hands of the public as to enable them to receive color pictures. (R. 147)

able that the tube is an assured fact (R. 152; Tr. 9376, 9485 (DuMont); Tr. 9922 (T. T. Goldsmith); cf. Tr. 6543, 11258, 11272-9, 11282 (Goldmark)).¹⁵ Because a time error of only 1/11,000,000 of a second adversely affects color fidelity (see *supra*, p. 10), RCA color receivers are expected to be more complex than CBS receivers, requiring components of critical tolerance (R. 153; Tr. 9247-8, 11229-32, 11263-6 (Goldmark); cf. Tr. 8236-9 (D. B. Smith); Tr. 10866-7 (Engstrom)).

Similarly, the camera and associated equipment under the RCA system are likely to be very complex and expensive both to purchase and to maintain (R. 154; Tr. 7970 (Fink); Tr. 3213-5, 9296, 11232-3 (Goldmark); RCA Ex. 378, Tr. 11015). These difficulties are compounded in respect of camera equipment for outdoor or other remote pickups, but, in any event, RCA never demonstrated such equipment¹⁶ (R. 154; Tr. 8100 (Fink); Tr. 11202 (Goldmark); Tr. 11480 (Lippincott); Tr. 9352 (Murphy)).

In respect of networking (*viz.*, transmitting programs originating in one city to other cities), RCA was unable, in the earlier stages of the hearing, to transmit color over the 2.7 megacycle coaxial cable;¹⁷ such transmissions resulted in receiving only black and white pictures (R. 154; Tr. 2718 (Engstrom)). On April 6, 1950, however, RCA simulated a color transmission over the 2.7 megacycle cable by using a special circuit which resulted in receipt of a color picture, but with reduced horizontal resolution (R.

¹⁵ The testimony of RCA's own witness, Dr. Engstrom, on this issue was conflicting: Compare Tr. 7847, 8595, 8597, 8599-8600 with Tr. 7849, 7921, 7925, 8587.

¹⁶ The lack of camera equipment for remote pickups precludes any but studio programs, and hence excludes sports and many public events programs from being telecast.

¹⁷ Television can be networked by three different means: The 2.7 megacycle coaxial cable, the 4 megacycle cable, and microwave relay. By far the greater number of cities are currently linked by 2.7 megacycle cable, but additional 4 megacycle cable and microwave relays are expected to be constructed within the next few years (Tr. 6974-7101).

154; Tr. 8140-4, 8148-9, 8150, 8152, 10877-9 (Engstrom); Tr. 11208-9 (Goldmark)). Final judgment on the feasibility of this method of networking RCA color, however, was impossible since further testing on the cable itself is required (R. 154; see Tr. 8144 (Engstrom)).

Conclusions concerning the RCA system. Based on the foregoing findings, the Commission concluded that the RCA system fell short of the minimum criteria which a color system must meet in order to be eligible for adoption (R. 159).¹⁸ More particularly, it concluded as follows:

(1) *The color fidelity* of the RCA system is not satisfactory and it would obviously not be in the public interest to

¹⁸ These minimum criteria were listed as follows (R. 155-6):

"a. It [a color system] must be capable of operating within a 6 megacycle channel allocation structure.

"b. It must be capable of producing a color picture which has a high quality of color fidelity, has adequate apparent definition, has good picture texture, and is not marred by such defects as misregistration, line crawl, jitter or unduly prominent dot or other structure.

"c. The color picture must be sufficiently bright so as to permit an adequate contrast range and so as to be capable of being viewed under normal home conditions without objectionable flicker.

"d. It must be capable of operating through receiver apparatus that is simple to operate in the home, does not have critical registration or color controls, and is cheap enough in price to be available to the great mass of the American purchasing public.

"e. It must be capable of operating through apparatus at the station that is technically within the competence of trained personnel hired by a station owner who does not have an extensive research or engineering staff at his disposal and the costs of purchase, operation, and maintenance of such equipment must not be so high as unduly to restrict the class of persons who can afford to operate a television station.

"f. It must not be unduly susceptible to interference as compared with the present monochrome system.

"g. It must be capable of transmitting color programs over inter-city relay facilities presently in existence or which may be developed in the foreseeable future."

The Commission expressly refused to include among its criteria the requirement that a color system be compatible (R. 156). For a discussion of the reasonableness of this judgment, see *infra*, pp. 89-96.

adopt as standard a color system which does not produce a satisfactory color picture. At none of the demonstrations on the record could RCA consistently produce pictures with adequate color fidelity. The inability to reproduce skin tones is a particularly serious handicap. Because of specified characteristics of the system or its associated apparatus "There appears to be no reasonable prospect" that the difficulties "can be overcome." (R. 159.)

(2) *The texture of the color picture is not satisfactory as a result of misregistration, dot structure and softness arising out of the problems of maintaining contrast in small areas. "It is difficult to see how these defects can be eliminated."* (R. 159-60.)

(3) *The receiving equipment is exceedingly complex. There is no assurance that even if the tri-color tube is developed satisfactorily, and can be produced at reasonable cost, the problem of complexity and difficulty of operation will not continue. Since a time error of 1/11,000,000 of a second results in color contamination, it is difficult to see how color control can be simplified to a sufficient extent for home use.* (R. 160.)

(4) *The station transmitting equipment is also exceedingly complex. There is no assurance that satisfactory commercial equipment can be built or, if it can, that it can be maintained in proper operation by average stations. The difficulties will be particularly onerous in the case of outdoor pickup equipment which is subject to much harder use and rougher handling than studio equipment, and which RCA did not demonstrate.* (R. 161.)

(5) *The RCA color system is much more susceptible to certain kinds of interference, such as would be received from other television receivers, than the present black and white system or the CBS color system.* (R. 161.)

(6) *In respect of networking, there is no assurance that RCA color transmissions can be transmitted over the 2.7*

megacycle coaxial cable facilities. However, the Commission expects the common carriers to have 4 megacycle facilities available for television "as soon as possible". (R. 161.)

(7) The RCA system has not met the requirements of successful *field testing* (R. 161-2).¹⁹

2. *The CBS field sequential system.* In contrast to the RCA system (R. 123), the CBS system accomplishes scanning in the same manner as the present black and white system (R. 121). However, it scans 405 lines as compared to the 525 lines of the black and white system (R. 122). It switches color at the end of each "field" so that its color switching rate is only 144 per second, as against RCA's rate of approximately 11,000,000 per second (R. 121-2; cf. R. 118-9):

The receivers used by CBS to demonstrate its system were receivers utilizing a rotating disc with colored segments, which is plated in front of the cathode-ray tube. At one demonstration, CBS also demonstrated an all-electronic projection receiver. (R. 123.) If, however, the RCA tri-color tube is successfully developed, it can be used with CBS receivers instead of the disc (R. 164).

Flicker. Large area flicker is not objectionable on the CBS disc type receiver up to highlight brightnesses of from 20 to 30 foot lamberts²⁰ (R. 133; Tr. 3170-1, 3177, 8956-7, 8962-4, 9249-50 (Goldmark); CBS Ex. 332, p. 11, Tr. 6393; CBS Ex. 348, Table 6c, Tr. 6741; CBS Ex. 349, Table 6b, Tr. 6741; cf. Tr. 2167 (Fink)). If tubes with "long persistence phosphors" (see *supra*, note 8, p. 8) were

¹⁹ For testimony in support of the conclusion that RCA has not been adequately field tested, see Tr. 7962-3, 8093 (Fink); Tr. 8201-8203, 8245-6, 8249 (D. B. Smith); Tr. 9956 (T. T. Goldsmith); Tr. 9687 (Baker); Tr. 9380 (DuMont); Tr. 7451 (Jensen); cf. Tr. 3137-42, 3157 (Goldmark).

²⁰ A foot lambert is the unit for measuring the brightness of light reflected from a surface (R. 133).

used, the brightness could be increased several times without causing flicker (R. 133; Tr. 3100, 3171-2, 3178, 9251, 11226-8 (Goldmark)). No problem of small area flicker was observed at any of the demonstrations on the record (R. 134; see Goldmark, Tr. 3182).²¹

Brightness—contrast. The maximum brightness achieved for a CBS disc receiver at any of the demonstrations was 22 foot lamberts. The color so produced is bright enough and has sufficient contrast range to be entirely adequate for use in the home under normal viewing conditions. (R. 136; Tr. 3318-9, 3326 (demonstration); Du Mont Ex. 276; Item D2, pp. 11, 29 and 31, Conclusion No. 3, Tr. 5737; Tr. 3160-3166 (Goldmark); Tr. 9315 (Judd); Tr. 3322 (Murphy); Tr. 11226 (Goldmark); CBS Ex. 332, pp. 2, 16, Tr. 6393; CBS Ex. 348, p. 32, Tables 3a and 3b, Tr. 6741; CBS Ex. 349, p. 6, Table 3, Tr. 6741.) In any event, brightness of receivers under the CBS system can be substantially increased by the use of tubes with long persistence phosphors (*supra*, pp. 8, 16; Tr. 9573 (demonstration); Tr. 3100, 9251, 11226-8 (Goldmark)).

Registration—color breakup and fringing. Only minor registration problems exist in the CBS system because

²¹ The Commission noted that if horizontal interlace (a method of transmitting signals so as to increase horizontal resolution) were utilized with the CBS system, a certain amount of small area flicker might appear, but would be minimized to an unascertainable extent by the use of tubes with long persistence phosphors (R. 134); Tr. 9229-31, 9579, 10828-9, 11271 (Goldmark); Tr. 9582, 9992 (T. Goldsmith)).

In this and a number of other instances, the Commission made findings concerning the possible effects of engrafting horizontal interlace upon the CBS system (see findings concerning resolution (R. 142-3), picture texture (R. 144), and susceptibility to interference (R. 145)). It is to be noted, however, that while it demonstrated horizontal interlace with its system (Tr. 9575-8), CBS did not propose it for standardization, conceding that it required further development and testing (Tr. 6615, 9222-3, 9243-4, 10815-16, 10818, 10821). The standards adopted by the Commission for color transmissions did not include standards for horizontal interlace.

its apparatus uses only a single tube both at the camera and in the disc type receiver. At none of the demonstrations on the record was any evidence of misregistration observed. (R. 139); Tr. 4734, 4753 (McIntosh); Tr. 5666, 9385 (DuMont); Tr. 11478-9, 11481 (Lippincott); Tr. 9315 (Judd); Tr. 3119-20, 3135, 9298, 11200 (Goldmark).)

Color breakup²² and color fringing²³ were observed at the demonstrations on the disc receivers; the former could be minimized by the use of tubes with long persistence phosphors (R. 139).²⁴

Color fidelity. The color fidelity of the CBS system as demonstrated on the disc receiver is of a uniformly high quality (R. 140; Tr. 3753, 3757-8, 9313 (Judd); Tr. 3798, 3814 (DuBarry); Tr. 8460 (Chapin); cf. Tr. 3143, 3152, 3155, 6539, 11205 (Goldmark); CBS Ex. 332, p. 11, Tr. 6393; CBS Ex. 348, p. 4, Tables 5a and 5b, Tr. 6741; CBS Ex. 349, Table 5, Tr. 6741).²⁵

Resolution. Since the CBS system produces 405 lines per picture as compared with 525 lines per picture for the present black and white system (*supra*, p. 16); there is a

²² Color breakup may occur when the eye moves while watching a color picture; it causes the viewer to see the separate primary colors (R. 137-8).

²³ Color fringing appears in the form of fringes along the edge of objects; it usually occurs when a rapidly moving object is televised in color (R. 138).

²⁴ The Commission concluded (*infra*, p. 22) that neither of these phenomena is of disturbing significance in the CBS pictures. The evidence abundantly supports this conclusion. (Tr. 3108, 3110, 3116 (Goldmark); Tr. 3331 (demonstration); Tr. 9954 (T. T. Goldsmith); Tr. 9390 (DuMont); Tr. 4259 (Sleeper); Tr. 6921 (D. B. Smith); CBS Ex. 332, p. 31, Tr. 6393; CBS Ex. 348, Table 6c, Tr. 6741; CBS Ex. 349, Table 6c, Tr. 6741.)

²⁵ Whether the same high quality of color fidelity can be maintained if a tri-color tube of the type developed by RCA were used with CBS receivers instead of a disc could not be determined on the record (R. 140-1).

46 per cent reduction in horizontal resolution. There is also a 23 per cent loss in vertical resolution (R. 142-3).²⁶ (For conclusions concerning the significance of these reductions, see *infra*, p. 22).

Picture texture—over-all picture quality. At all of the demonstrations, the CBS picture compared favorably with the present black and white system in respect of contrast, sharpness of picture and freedom from line structure (R. 144);²⁷ Tr. 10640 (Chapin); Tr. 6592, 6610, 11219-23 (Goldmark); FCC Ex. 388, p. 4, Tr. 8491; CBS Ex. 332, p. 22, Tr. 6393; CBS Ex. 348, p. 3, Tables 4a and 4b, Tr. 6741; CBS Ex. 349, Table 4, Tr. 6741; cf. Tr. 9386, 9458 (DuMont)).

Susceptibility to interference. The susceptibility of the CBS system to interference is substantially the same as that of the existing black and white system (R. 145); CBS Ex. 329, Tr. 6307; FCC Ex. 389 and 391, Tr. 8491; Tr. 6268-73, 6287, 6289-91, 9171 (Wright); Tr. 8455, 8457 (Chapin); Tr. 3153-4, 3494-7 (Goldmark); Tr. 8097 (Fink); RCA Ex. 369, Tables V and VI, Tr. 7829).

Adaptability; quality of black and white picture from color. The CBS system is incompatible but adaptable, since existing black and white receivers are unable to receive a black and white picture from CBS color transmissions unless the receivers are adapted by adding equipment to them or making other changes (R. 147). The costs of adapting existing sets now in the hands of the public were variously estimated at \$32 to \$50 by CBS witnesses (with a "somewhat lower price" if the adaptation

²⁶ By utilizing horizontal interlace (*supra*, note 21, p. 17), the horizontal resolution would be approximately that of black and white, but further testing is necessary to determine whether this degree of increase can be achieved in practice (R. 143).

²⁷ For references supporting the finding relating to contrast, see *supra*, p. 17.

is accomplished by rewiring the circuits),²⁸ \$75 to \$100 by witnesses for the Philco Corporation, and \$100 to \$125 by witnesses for the Allen B. DuMont Laboratories, Inc. The Philco and DuMont estimates, however, were rejected as unreasonably high, particularly in the light of testimony that the parts used in the adaptation performed by the Commission's laboratory ranged in cost from \$4 to \$12. (R. 147-8.)

While the resolution of the black and white picture received from CBS color on an adapted set is less than the resolution of the standard black and white picture, the picture is nevertheless acceptable (R. 164); Tr. 6627-8 (Goldmark); CBS Ex. 348, pp. 3, 5, 7, Tables 10 and 11, Tr. 6741).

Convertibility. Existing black and white receivers can be adapted and converted to enable them to receive color transmissions in color²⁹ (R. 148); Tr. 3091-2, 3448 (Goldmark); Tr. 9000 (Schubert); Tr. 3685, 9139-42 (Cushway); Tr. 3734, 9147, 9154-68 (Kohner); Tr. 10778-81 (Murphy)). The retail price of such adaptation and conversion ranges from \$95 to \$170, depending in part on the size of the color picture to be produced by the converter (R. 148-9); Tr. 3591-2 (Mulhern); Tr. 3687, 3690, 9135 (Cushway)).

Equipment considerations. At the present time, the receivers in the CBS system are limited to projection receivers or to direct-view receivers using the disc and producing a color picture of 12½ inches without the use of a magnifier or 16 inches magnified (R. 150). According to independent manufacturers called as CBS witnesses,

²⁸ A witness representing Webster-Chicago, a manufacturer, estimated that the cost of achieving adaptation of existing sets by rewiring would be one-half of the cost of achieving adaptation by installing a complete external adapter (Tr. 3687).

²⁹ The Commission found that some existing black and white receivers with doors or recessed tubes would, in practice, be difficult to convert (R. 148).

the retail price of a combination black and white and color receiver, using a disc, would be \$200 for a 7 inch tube magnified to 10 inches, and \$300 for a 10 inch tube magnified to 12½ inches. DuMont testified that a combination black and white and color set with a 12 inch tube (unmagnified) would retail at \$500-\$600 as compared with \$329 for a DuMont black and white set of similar quality. (R. 150-1.)

The CBS disc type receiver, and operation thereof, are relatively simple; the color control is not critical (R. 151); Tr. 3217-8, 3220, 6561-2, 11231-2 (Goldmark); Tr. 8460 (Chapin); Tr. 3667 (Hamilton); Tr. 3592 (Mulhern)). Since the standards of transmissions for black and white and for CBS color are different, and the receiver must be switched to change from one to the other when desired, broadcasters cannot readily change from black and white to CBS color, or vice versa, during the course of a program (R. 151-2).

The camera and associated equipment used with the CBS system involve no critical controls and CBS successfully demonstrated outdoor pickups (R. 152).

In respect of networking, CBS color pictures can be transmitted over 2.7 megacycle coaxial cable (R. 152).

Conclusions concerning the CBS system. On the basis of the foregoing findings concerning the CBS system, the Commission concluded that the CBS system met all of the criteria for a satisfactory color system³⁰ (R. 414-15); see also R. 166). Specifically, it concluded in its First Report as follows:

(1) The CBS system produces a color picture which is most satisfactory from the point of view of *texture, color fidelity* and *contrast*. The demonstrations included a wide variety of subject matter both in the studio and outdoors

³⁰ See *supra*, note 18, p. 14 for the criteria established by the Commission.

and the picture produced in each case was entirely suitable for home viewing purposes. (R. 163.)

(2) *Receivers and station equipment* are simple to handle and have been subjected to use in widely diversified circumstances without difficulty. The receivers are simple and when produced on a mass marketing basis, should be within the economic reach of the great mass of the purchasing public. (R. 163.)

(3) While the CBS system has greater susceptibility to *flicker* than the present black and white system, the brightnesses achieved on disc receivers are adequate for home use; further, long persistence phosphors used on non-disc receivers provided a specific method of increasing brightness with no objectionable flicker (R. 163).

(4) The susceptibility of the CBS system to *color fringing* and *color breakup* in certain circumstances is not a serious obstacle since the defects are not obtrusive, they occur infrequently, and they can be minimized by programming techniques (R. 163).

(5) The loss of geometric *resolution* in the CBS system is "more than outweigh[ed]" by the addition of color, as far as apparent definition is concerned (R. 163-4).³¹

(6) The CBS system was, at the time of the decision, limited as a practical matter, to projection receivers or direct view receivers of a maximum of 12½ inches (capable of being magnified to 16 inches). The tri-color tube demonstrated by RCA is not limited in picture size and can be utilized with the CBS system, thus providing a method whereby the CBS receivers can be freed of picture size

³¹ See Tr. 4184-7, 4011, 6603, 6610, 6627, 6635-7, 8893-5 (Goldmark); Tr. 9315 (Judd); Tr. 10640 (Chapin); FCC Ex. 388, p. 4, Tr. 8491; CBS Ex. 332, p. 22, Tr. 6393; CBS Ex. 348, p. 3, Tables 4a and 4b, Tr. 6741; CBS Ex. 349, Table 4, Tr. 6741; cf. Tr. 9458 (DuMont). For testimony establishing that color adds considerably to apparent definition, see Tr. 4287 (Sleeper); Tr. 4743 (McIntosh); Tr. 6138 (Engstrom). See *infra*, pp. 80-82.

limitations.³² However, since the RCA demonstration of its tube with its system revealed various defects in the tube as it then existed, the Commission was unable to conclude that the tube had been successfully developed. In addition, there was no demonstration of a direct view tri-color tube on the CBS system. Accordingly, there was no definitive answer in respect of whether direct view tubes larger than 12½ inches are possible with the CBS system. (R. 164.)³³

D. *The Commission's conclusions concerning postponement of the adoption of standards.* Despite the foregoing findings and conclusions that the addition of color was a fundamental improvement in television, that the RCA and the CTI systems failed in important respects to meet the minimum criteria for the adoption of a color system, and that the CBS system was satisfactory and suitable for immediate adoption (R. 166), the Commission did not adopt standards for the CBS system at the time of its First Report.

Instead, the Commission postponed adoption of such standards on the ground that the record disclosed further possibilities for the development of the CBS system, or apparatus associated with it, which the Commission desired to take time to explore if the public interest were not adversely affected by the postponement of a final decision (R. 164-6). These potential improvements involved (1) the use of a tri-color tube, such as that demonstrated by RCA, with the CBS system as a means of freeing it from direct view picture size limitations (*supra*, pp. 20-21); (2) the addition of horizontal interlace as a means of increasing horizontal resolution (*supra*, note 26, p. 19); and (3) the use of long persistence phosphors on tubes so as to

³² The use of a tri-color tube in CBS receivers would dispense with the need for the disc, which is responsible for the picture-size limitation on direct view receivers.

³³ For additional conclusions, embodied in the Second Report, relating to the question of CBS picture size, see *infra*, p. 29.

increase brightness potentiality without flicker (*supra*, pp. 16-17). The Commission noted that none of these developments had yet been fully proven or tested or sufficiently demonstrated and that if either horizontal interlace or long persistence phosphors were successfully developed, they might justify changes in, or additions to, existing black and white television standards as well as the proposed CBS color standards³⁴ (R. 165).

In addition to these three matters, the Commission also noted (R. 165-6) that there was "the possibility" of new color systems and improvements in existing color systems which had been informally called to its attention since the hearings had closed. It stated that since these matters relating to new systems and improvements were not of record, they could not be relied on in reaching a decision without reopening the record.

The Commission stated, however, that despite the advantages of postponing adoption of standards for the CBS color system in order to await the outcome of further developments or testing in respect of the foregoing four matters, there was an important counterbalancing disadvantage. This disadvantage arose from the fact of the incompatibility of the CBS system. Because of this fact, delay in adopting standards for the CBS system—a system which the Commission found to be satisfactory—would aggravate the problem of incompatibility by increasing the number of black and white receivers in the hands of the public and hence currently incapable of receiving the color signals under the CBS standards.³⁵ (R. 165-6.) As the Commis-

³⁴ The changes would be with respect to the field and line repetition rate in transmission (R. 165-6). These changes in transmission standards would involve correlative changes in receivers so that they would be capable of handling the different synchronizing rates (R. 166-7).

³⁵ In this connection, it is also to be noted that the Commission found (R. 147-8) that the cost of building the necessary additional circuits into a new receiver at the factory to permit it to receive CBS color transmissions in black and white (i. e. "internal

sion found (R. 166), the problem of postponement was grave since

“eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public.”

The Commission further noted that “one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing . . .” (R. 166). Postponement of adoption of the CBS system, therefore, would mean that if, after such postponement, the claimed new or improved compatible systems would still prove to be unsatisfactory,—and they had been found to have inherent defects which made satisfactory development doubtful—adoption of the only known and proven satisfactory system might be impracticable because of the greatly increased number of receivers in the hands of the public which would require adaptation or conversion. Delay thus might result in a serious obstacle to making color television available to the public at all. (R. 165-6.)

Thus the Commission was faced, as it stated, with these two “difficult courses” of action (R. 164-5)—immediate adoption of CBS standards, on the one hand, without an opportunity to explore the four matters specified, and postponement of such adoption, on the other hand, with the attendant injury to the public arising out of the re-

adaptation”) is “substantially lower” than the cost of external adaptation of existing receivers in the hands of the public. RCA itself estimated the cost of internal adaptation for manual switching at \$7 to \$10, and \$20 to \$24 for automatic switching (Tr. 8558, 10048-9, 10091; RMA Ex. 408, pp. 29-30, Tr. 9617). The cost of \$7-\$10 for internal adaptation estimated by RCA should be compared with the estimates by manufacturers called by CBS of \$32-\$50 for external adaptation (*supra*, pp. 19-20). Thus obviously a delay in adopting CBS standards would, since it involves a delay in producing internally adapted sets, increase the costs to the consumer by the difference in cost between internal adaptation and external adaptation. See *infra*, pp. 140-142.

sulting growth of the problem of incompatibility. It sought to resolve the dilemma by deciding to delay final adoption of the satisfactory CBS systems if a way could be found to prevent the interim aggravation of the problems arising out of incompatibility. If no method could be devised to accomplish this purpose, the Commission stated, "the CBS color system should now be adopted." (R. 166.)

The Commission, accordingly, suggested as a method of confining the compatibility problem, and hence permitting time for further exploration of the new developments, the adoption of new standards for transmitting *black and white* television signals. The suggested new standards would be "bracket standards"—that is, existing black and white transmission standards would be amended so as to encompass a range of "lines" and "fields". Such new standards would include a range of such lines and fields which would permit receivers built to accept such a range to receive the present black and white transmissions and the proposed CBS color transmissions in black and white. They would, in addition, permit reception on such newly built receivers of transmissions under black and white standards as they might be amended within the range in the future and CBS color standards as they might be similarly amended, to the extent that such future amendments might be justified by developments in respect of long persistence phosphors and horizontal interlace. The Commission stated that if (1) it proved feasible promptly to adopt such bracket standards for black and white transmissions, and (2) manufacturers of television receivers would advise the Commission that they would promptly build black and white receivers capable of receiving the new range of standards, then the Commission could, consistently with the public interest, postpone final decision for a specified time, because the new black and white receivers would, without further change, be able to receive not only black and white signals either

in their present form or as amended but also the CBS color signals in black and white. Since, therefore, all new receivers would be compatible, a cut-off for the problem of incompatibility would be achieved. (R. 166-8.)

The Commission expressly stated (R. 168), however, that if bracket standards could not be adopted promptly, or if assurances were not received from a sufficient number of manufacturers that they planned promptly to incorporate bracket standards in their receivers,—

the Commission will not feel free to postpone a decision, for every day that passes would aggravate the compatibility problem. In that event, a final decision would be issued adopting the CBS color standards.³⁶

Accordingly, concurrently with the First Report, the Commission issued a Second Notice of Further Proposed Rule Making (R. 288) proposing the adoption of bracket standards and inviting comment, including alternative suggestions, from all interested persons. On or about September 29, 1950, thirty-three comments were received. In general, they expressed opposition to the adoption of bracket standards and indicated that the television receiver manufacturers either could not or would not manufacture receivers capable of receiving transmissions under the bracket standards within the time proposed by the Commission. No alternative suggestions for dealing with the

³⁶ Commissioners Hyde (R. 188) and Jones (R. 193) disagreed with the majority in that they believed that standards for the CBS system should have been adopted forthwith and without the delay suggested by the majority. Commissioner Hennock filed "separate views", stating that the postponement of adoption of the CBS standards to permit further experimentation under certain conditions was for too short a time and should be extended to June 30, 1951 (R. 190). She explicitly stated, however, that if sufficient assurances were not received from manufacturers that bracket standards would be built with receivers thereafter produced, "I would adopt field sequential color standards" (R. 190). She also noted her agreement with her colleagues "in their evaluation of the present state of the relative development of the various proposed systems" (R. 193).

containment of the problem of compatibility were advanced in any of the comments. (R. 416).

On October 4, 1950, RCA filed a petition (R. 408) requesting that the Commission review, between December 5, 1950, and January 5, 1951, claimed improvements in the performances of its system, and that before reaching a final determination, the Commission view, during the period to June 30, 1951, further experimental broadcasts of the three proposed and any new color systems.

E. The Second Report. On October 10, 1950, the Commission issued its Second Report (R. 413). It noted that the comments which it had received established that bracket standards could not be promptly adopted and "bracket standard" receivers would not be promptly made; further, it noted that the manufacturers had not suggested any other method of maintaining the status quo in respect of compatibility if a decision were postponed (R. 416). Since it appeared, therefore, that there was no way of containing the compatibility problem, the Commission concluded (R. 416) that—

... we would be derelict in our responsibility to the public if we postponed a decision any longer. With no way of preventing the growth of incompatibility, the longer we wait before arriving at a final decision the greater the number of receivers in the hands of the public that will have to be adapted or converted if at a later date the CBS color system is adopted.

Further, the Commission stated (R. 415) that by delay, the Commission

would be in the position of inviting the risk that if, after postponing a decision, the compatible color systems should again fail to meet the minimum criteria for a color system, as they have failed in the past, the number of receivers in the hands of the public would have increased to such a point where, as a practical matter, it might not be practicable to adopt an incompatible color system even though we now know that such system meets all the criteria for a color system.

After thus explicitly concluding that even without the possible new developments, the CBS system and apparatus as actually demonstrated met all the criteria for the adoption of a color system, the Commission reviewed the four factors which had prompted it to seek a means of postponement without increasing incompatibility, and it reaffirmed its conclusion in the First Report that, absent a means of containing the compatibility problem, none of the factors was such as to warrant postponement.

Thus, in respect of awaiting further development of a tri-color tube in order to determine definitively whether the CBS direct view receivers could thereby be freed of the limitation to 12½ inch size, the Commission concluded that the public might well prefer a 12½ inch direct view color picture to a larger size black and white picture,³⁷ and that in any event, adoption of CBS standards would furnish a "healthy incentive" to develop a means—either a tri-color tube or some other apparatus³⁸—of producing larger size direct view color pictures (R. 418).

In respect of horizontal interlace, the Commission had already concluded (R. 163-4, 415) that while the CBS system has less geometric resolution than the present black and white system, "the addition of color more than outweighs the loss in geometric resolution so far as apparent definition is concerned." It further noted that in any event, if the technique of horizontal interlace is successfully developed in the future for use with the CBS sys-

³⁷ For testimony indicating such a preference, see CBS Ex. 332, pp. 3, 23-25, Tr. 6393. Similarly Dr. Engstrom, RCA's vice-president in charge of research (Tr. 2648), testified that he was uncertain whether a limitation of picture size was basic in inaugurating a color television service (Tr. 10892). Commissioner Sterling, however, dissented from the Commission's conclusion in respect of CBS picture size (R. 429).

³⁸ Development of receiver apparatus capable of producing direct view pictures larger than 12½ inches under the CBS system would not involve a change in the system itself or in the standards adopted by the Commission, nor, when perfected and produced, would it obsolete disc receivers then in the hands of the public.

tem, it can be added without affecting receivers then in the hands of the public (R. 418-9).

Similarly, in respect of long persistence phosphors, the Commission had concluded that the CBS system had met the criteria in respect of brightness-flicker characteristics (*supra*, pp. 16-17, 22) and it noted that, in any event, such phosphors, if and when developed, could be utilized in receivers made after such development so as to increase the brightness potential without flicker; this, however, is a matter only of improved equipment which would not make obsolete or affect the utility of the already satisfactory equipment sold after the adoption of CBS standards and before the perfection of such phosphors³⁹ (R. 419).

In respect of the possibility of new or improved compatible systems, the Commission stated (R. 419) that such developments were not entitled to a hearing or a reopening of a hearing "simply on the basis of a paper presentation." Because it is "a long step" from description of theoretical systems on paper and "successful operation", there can be "no assurance that a system is going to work until the apparatus has been built and has been tested." (R. 419.) The Commission concluded (R. 419-20), therefore that

None of the new systems or improvements in systems meet these tests so as to warrant reopening of the hearing. To do so would be inviting the risk that these new systems might fail as have all color systems in the past which we have been urged to adopt on the grounds of compatibility and the increase in number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory.

³⁹ In respect of the future development of both horizontal interlace (R. 418-9) and long persistence phosphors (R. 419), the Commission did say that because it was unable to adopt bracket standards, it would be possible to take advantage of such development only through the use of improved equipment rather than by making such changes in standards (lines and field rates) as the developments might justify in the future.

The Commission did, however, explicitly leave the door open for the future consideration, upon a proper showing, of new and improved systems (R. 420; see R. 169).

Simultaneously with its Second Report, the Commission issued orders (1) denying the RCA petition of October 4, 1950, to postpone a final determination (R. 410),⁴⁰ and (2) amending the Commission's standards of Good Engineering Practice to permit the regular non-experimental transmission of color television in accordance with the field sequential standards⁴¹ (R. 432).

⁴⁰ In its unanimous order denying the RCA petition, the Commission noted (R. 410-11) that there had been extensive proceedings, that in its First Report, it had specified the terms and conditions under which it might consider reopening the record, and that . . . petitioner has had a full and fair opportunity to present its proposals to the Commission; that the state of the television art is such that the new ideas and new inventions are matters of weekly, even daily occurrence; that the question of approving a color television system which will best serve the interests of the American people is one which has been before the Commission for almost 10 years; that in all proceedings such as the instant one a point is reached which calls for administrative finality with respect to the Commission's hearing processes; and that in the sound discretion of the Commission a delay in reaching a determination with respect to the adoption of standards for a color television service as requested in the instant petition would not be conducive to the orderly and expeditious dispatch of the Commission's business and would not best serve the ends of justice;

⁴¹ Commissioner Sterling (R. 421) and Hennock (R. 429) dissented from the Second Report and the order amending the standards of Good Engineering Practice. Commissioner Sterling stated that further time should have been permitted to explore the adoption of bracket standards, and that a conference should have been held with the manufacturing industry to agree on a "realistic timetable". He stated, however, that if this procedure should not result in a "practical solution" to contain the compatibility problem, "I would then join the majority in authorizing the field sequential system." Commissioner Hennock dissented on the ground that compatibility was so desirable that final decision should be postponed until June 30, 1951, to provide further opportunity for developing such a system. She agreed, however, that if steps could not be taken within 90 days to arrest the growth of incompatibility by the adoption of bracket standards or some other means, standards for the field sequential system should then be immediately adopted.

SUMMARY OF ARGUMENT.

I.

The order of the Commission, adopting the field sequential system as a standard for color television broadcasting, is based upon extensive, comprehensive and detailed evidentiary and ultimate findings of fact fully set out in the two reports of the Commission. The determinations of policy which were involved in reaching the conclusion that the field sequential system was satisfactory, and that the dot sequential system was not, were fully articulated in a manner which discloses that they are reasonable judgments within the scope of the Commission's statutory authority and the area of its discretion to make quasi-legislative judgments in the public interest. Indeed in the light of the complicated nature of the subject matter, the fullness with which the technical and policy issues presented were comprehensively explored in a hearing on the record, and the care with which the findings and conclusions based on that record have been set out, this appeal presents the classic case for judicial non-intervention in the absence of clearly arbitrary action or other departure from the ambit of authority conferred on the agency by Congress. See, e.g., *American Telephone and Telegraph Company v. United States*, 299 U. S. 232, 236-237; *National Broadcasting Company v. United States*, 319 U. S. 190.

Although it is believed that the provisions of Section 10(e) of the Administrative Procedure Act are not intended to work a revision of the well-settled limitation on the judicial power to review quasi-legislative determinations of the type here involved, it is unnecessary to resolve that question here. For even if the applicable scope of review be that the order must be supported by "substantial evidence on the whole record", the Commission's findings are clearly so supported.

A. The Commission made detailed findings of fact reflecting consideration of all the evidence, favorable and un-

favorable, with respect to the performance characteristics of the dot sequential system and the field sequential systems. On the basis of these findings, the Commission concluded in its First Report that the field sequential system met the criteria for a satisfactory system and that the dot sequential system did not. Appellants' claim that the findings adverse to the RCA system were based on evidence taken in earlier portions of the hearing which had been superseded by later development is discredited by the Commission's findings, which plainly reflect consideration of all testimony and demonstrations on the record down to its closing. And the record itself discloses ample evidence in the latter phases of the hearing held in 1950 in support of the Commission's findings and conclusions. Similarly, appellants' claim that the Commission adopted the field sequential system in the face of its own recognition that further information was required with respect to its performance characteristics ignores specific findings of the Commission in its Final Report that the field sequential system, in its present state of development, is suitable for adoption.

B. The Commission's choice of criteria and the weight which it gave the various relative factors in determining whether a color system was suitable for adoption were wholly reasonable. Appellants' contentions that the Commission should have selected other criteria and should have made other evaluations amount to no more than a quarrel with the Commission's judgment on matters committed to it for decision by Congress. Appellants advance no considerations which are not adequately dealt with in the Commission's reports. The reports reflect a thoughtful consideration of all relevant issues of policy and a resolution of these issues in a manner which is plainly not unreasonable.

Appellants' contention that the Commission's criteria reflected inadequate consideration of the factors of resolution, picture size, and flicker-brightness relationship, is discredited by the findings and conclusions of the Commission.

There is ample support in the record for the Commission's conclusion that geometric resolution should not be treated as a separate criterion, but should be treated as one of many factors making up the composite factor of over-all definition or apparent definition. Similarly, there is ample evidence in the record to support the Commission's refusal to insist, as a condition on adopting a color system, that receiver apparatus must be able to produce direct-view pictures in excess of 12½ inches. And with respect to flicker-brightness relationship, the record affords complete support for the Commission's conclusion that the CBS system met the criterion of adequate brightness without objectionable flicker. The claim that the Commission erroneously failed to include among its criteria the factor of "channel utilization" ignores the fact that in evaluating the systems and the relevant evidence, the Commission was dealing with the very issue which appellants contend it omitted, for obviously that system which best meets the criteria which the Commission did enunciate also most effectively utilizes the spectrum space.

The Commission properly refused to accede to appellants' claim that the Commission should adopt only a system which is compatible, i.e., the color transmissions of which can be received on existing black and white sets as a black and white picture. The Commission gave the fullest consideration to this question, and decided that while compatibility was a desirable feature if it could be achieved in a system which also gave a satisfactory color picture, in fact no such system had been produced. The Commission concluded that on the basis of the record in this proceeding and its prior experience, compatibility is too high a price to put on color, since it had resulted in, and bore little promise of avoiding, excessive complexity or unsatisfactory pictures or both. This reasoned determination of the Commission, involving a host of factors hinging on both present performance and expert judgments concerning the future, is the very type of judgment which the Commission was particularly established by Congress to make. And its decision to adopt color television standards which are in-

compatible with present black and white television standards is wholly consistent with principles previously enunciated by the Commission.

C. The Commission's consideration of the possibility of delaying final decision for the purpose of securing information concerning further developments in color television if it were possible to do so without aggravating the compatibility problem was reasonable and involved no illegality. The Commission expressly recognized that the possible improvements which it had under consideration were not indispensable prerequisites to the adoption of the field sequential system and felt that time should be given for the exploration of those possibilities only if some way could be devised for avoiding the aggravation of the compatibility problem. The proposal for the adoption of bracket standards was offered as such a means. It was not a proposal to compel adoption of bracket standards without a hearing or to regulate the manufacture of receivers. It was, rather, an entirely reasonable action of the Commission in seeking information in order to ascertain whether delay in the adoption of CBS standards would be possible without grave injury to the public interest.

D. The Commission properly refused to adopt transmission standards permitting regular broadcasting under the RCA system as well as under the CBS system. Since it had found that the RCA system did not meet the criteria for a satisfactory color system, the Commission did not properly have before it the question whether it should also authorize standards for that system, as well as the CBS system which it had found to be satisfactory.

1. Sections 303(b) and (c) confer on the Commission ample authority to set engineering standards for broadcast transmission. Its authority must be exercised in conformity with the criterion of the "public interest, convenience and necessity." The legislative history makes it plain that the effect of transmission standards on the type of equipment which must be used by the public in order to receive a given service is a matter which the Commission may consider. The consistent practice of the Commission, both

before and since the enactment of the Communications Act, has been to authorize only a single set of standards for a given service.

Appellants claim that no injury to the public would be inflicted by authorizing standards for its system as well as the field sequential system. But that contention is at odds with the explicit findings of the Commission not only that appellants' system gave an unsatisfactory color picture, but also that the black and white picture it produced was inferior to that transmitted under existing black and white standards, and that the system was susceptible to additional interference. Hence authorization of such a system would injure the viewing public by inducing the purchase of receivers designed to receive signals of a system incapable of producing satisfactory pictures and divert broadcasters to investments in a defective color system.

2. Appellants are also mistaken in their contention that adoption of a single set of standards for color is forbidden because it fosters monopoly and therefore transgresses the policy of the Communications Act to establish the maximum possible competition. That argument ignores the nature of the subject matter, which requires adoption of standards, and the nature of the competition which the Commission is under an affirmative duty to promote. The type of competition which is calculated to achieve the objective of maximum utilization of frequencies in the public interest is not regulated competition of superior and inferior means of transmission, but, rather, competition between licensees using authorized and standardized means of transmission for the attention of the listening and viewing public.

3. Since the Commission properly decided that the dot sequential system was unsatisfactory, it was not presented with the question whether, if that system were otherwise satisfactory, it, as well as the field sequential system, should be adopted. Therefore, the Commission was not required to make findings on the issue of multiple standards. In fact, the contention that the Commission should have authorized multiple standards is an afterthought. In the

proceedings before the Commission, appellants' position was that its system alone should be adopted. No alternative was formally proposed and there was substantially no dispute before the Commission that single standards were to be preferred.

E. The court below properly sustained the Commission's order. It specifically considered in its opinion every substantial attack made by the appellants on the validity of the Commission's order. Guided by the well-established principle that the power of a court reviewing administrative rule-making is stringently confined, the court below rejected appellants' contentions that the Commission's order was erroneous as a matter of fact and as a matter of policy.

If the court below rested its conclusion that the case should not be remanded to the Commission for further proceedings in the light of allegedly new developments partly on the ground that its power to do so was doubtful and that the finality of decision by this Court was sorely needed in this case, it was not in error in so doing. The doubts of the court below as to its power to remand on that ground are clearly confirmed by decisions of this Court to the effect that it is not for the courts, short of a showing of a clear abuse of discretion, which was certainly not made here, to decide whether an administrative record has become so stale as to require further consideration in the public interest. See *United States v. Pierce Auto Lines*, 327 U. S. 515, 535; *Interstate Commerce Commission v. Jersey City*, 322 U. S. 503. Particularly when, as here, the public interest as found by the Commission would be gravely injured by delaying the effectiveness of the Commission's order, remand for further consideration of this question would not only be an empty gesture but a distinct disservice to the public.

II.

A. The Commission properly refused to base any determination on *ex parte* consideration of material outside the record and properly failed to reopen the record on the

basis of such material. Consideration of RCA's so-called "Progress Report" on an *ex parte* basis would have substantially negated the Commission's deliberate choice of submitting all the evidence and opinion on the color television issue to the exacting crucible of the open hearing, sworn testimony, the personal appearance of witnesses, and cross-examination. In any event, this report contained nothing with respect to those features of the RCA system which the Commission had found to be fatally defective and probably inherent in the system, which justified consideration as anything more than the assertion of unsupported claims of a type which had been made by RCA prior to the hearings and during its course.

The Commission clearly did not abuse its discretion in refusing to rely, without reopening the record, on the Condon Committee Report as a basis for its decision. That report had been prepared at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce and was intended to advise him concerning the status of color television. It was made on the basis of limited testimony and demonstrations on the record before the Commission, and it referred to no new evidence relating to the systems under consideration by the Commission.

In the light of the contents of both these reports, and appellants' failure to make any clear request that the Commission reopen the record for their consideration, it is clear that the Commission did not abuse its discretion in failing to do so on its own motion.

B. The Commission also properly exercised its discretion in denying the RCA petition of October 4, 1950, to postpone the making of a final decision. That petition contained nothing definitive which had not already been before the Commission. It made no specific or significant claims of present achievement and it made no offer of proof. It did not ask the Commission to examine the system at that time but requested only that the issues be held open for nine months, at the end of which time the petition promised a system which would be ready for adoption. As the Commission noted in denying this petition, RCA had had a full

opportunity to present its evidence during the lengthy hearings and, especially in the field of electronics where there are constant developments, there must be a stopping point somewhere. The granting of the petition for delay would have resulted in grave injury to the public, for if ultimately the RCA system still proved inherently defective, as the Commission found likely, the public interest would be adversely affected by aggravation of the problem of incompatibility, resulting either in a large economic cost to the public at the least or the indefinite deprivation of color television at the most. In these circumstances, the refusal of the Commission to postpone decision was clearly reasonable.

C. The participation in the proceedings of Chapin, a Commission staff engineer, was proper and did not vitiate the Commission's order. Chapin had no financial interest in the device, since he had executed an assignment to the Government, and he had nothing else at stake. There having been no showing of bias on the part of the Commission, the objection to Chapin's participation, characterized by appellants before the Commission as "a matter of appearance more than anything else", cannot, under the decisions of this Court void the Commission's order. *Champlin Refining Co. v. Commission*, 286 U. S. 210, 236; *United States v. Morgan*, 313 U. S. 409, 421.

III.

The subpoenas requested by Pilot Radio Corporation for the production of correspondence between the Chairman of the Interstate and Foreign Commerce Committee and the Commission or any of its members, and officials of CBS, were properly quashed by the court below since they were not relevant to any allegation made in either Pilot's complaint or its motion to intervene as plaintiff. Moreover, the request was frivolous, since in the absence of a substantial showing of improper conduct—and none was made here—courts will not go behind the record to probe into the mental processes by which administrative determinations are made.

ARGUMENT.

I.

THE COMMISSION'S ORDER WAS REASONABLE AND THE COURT BELOW PROPERLY SO FOUND.

Introduction.—As appears from the Statement, *supra*, pp. 3-31, the Commission unanimously made extensive, comprehensive, and detailed evidentiary and ultimate findings of fact relating, *inter alia*, to the respective merits and deficiencies in the performance of the CBS and RCA color systems.⁴² These findings were the product of a painstaking analysis of the technical features and performance characteristics of the systems. They were based not only on a critical analysis of the theoretical principles upon which each system was founded, and of the 10,000 pages of testimony and 265 exhibits, but also upon the actual viewing by the Commissioners themselves of demonstrations on the record, including comparative demonstrations, of the performance of the systems.

In these circumstances, and whatever the proper scope of judicial review in a case such as this, the appellants would have an exceedingly heavy burden to bear in attempting to establish the unreasonableness of the Commission's determinations or the invalidity of its findings of fact. But that burden becomes even greater when, as here, the administrative order under attack is the product of a rule-making proceeding—primarily a legislative and not an adjudicatory process.

For the invalidity of such an order can be established only on a showing that it bears no reasonable relation—in fact or as a policy matter—to the statutory duty of the

⁴² While Commissioner Sterling, in his dissent from the Commission's Second Report (R. 421), expressed his disagreement with the majority belief that the public might prefer smaller color pictures to larger black and white, he had no disagreement with the majority as to the relative merits of the RCA and CBS systems.

Commission to regulate transmission standards and apparatus (Section 303(b) and (e) in particular) and the statutory objective of encouraging "the larger and more effective use of radio in the public interest." Section 303(g) of the Communications Act of 1934, Appendix A, *infra*, p. 154. The scope of the issue concerning reasonableness is narrow. The judicial inquiry is at an end if there is found a rational relation of the regulation to the statute, and to the ends sought to be achieved; the question is whether the particular alternative which the Commission selected among many alternatives to achieve the objectives of the Act is one which, in the circumstances, a rational person could have chosen. Cf. *Final Report of the Attorney General's Committee on Administrative Procedure*, S. Doc. 8, 77th Cong., 1st Sess., pp. 116, 117, 119. Only if the regulations are unreasonable, arbitrary, or capricious will they be set aside. *American Telephone and Telegraph Co. v. United States*, 299 U. S. 232, 236-237; *National Broadcasting Co. v. United States*, 319 U. S. 190; *Pacific States Box & Basket Co. v. White*, 296 U. S. 176, 182; *Chicago, R. I. & P. Ry. v. United States*, 284 U. S. 80, 95-96; *Houston v. St. Louis Independent Packing Co.*, 249 U. S. 479, 484, 487.⁴³ And the doctrine of administrative finality applies with especial force when, as here, the judgments involved in promulgating regulations are necessarily prospective. Cf. *Railroad Commission of Texas v. Rowan & Nichols Co.*, 310 U. S. 573, 581; 311 U. S. 570, 575, 577.⁴⁴ Here the issues before the Commission were

⁴³ Indeed, in passing upon the validity of administrative regulations, this Court has even invoked a presumption of the existence of facts to support the regulations. *Pacific States Box & Basket Co. v. White*, 296 U. S. 176; *United States v. Rock Royal Co-operative*, 307 U. S. 533, 567-568; *St. Joseph Stock Yards Co. v. United States*, 298 U. S. 38, 83 (Brandeis, J., concurring).

⁴⁴ Cases in which administrative "rule-making" regulations were reviewed to determine whether there was "substantial evidence" to support the findings of fact were cases, unlike this, in which the statute specifically prescribed that scope of review. See, e. g., *Federal Security Administrator v. Quaker Oats Co.*, 318 U. S. 218, 228; *Opp Cotton Mills v. Administrator*, 312 U. S. 126, 156.

difficult and complex, involving the formulation of highly technical rules which operate *in futuro*. It is precisely for these reasons that its decision, once made and passed from the administrative to the judicial process, presents the classic case for judicial non-intervention in the absence of clearly arbitrary action or other departure from the ambit of authority conferred on the agency by Congress.

Although we believe that even its most stringent standards were fully satisfied, it is to be doubted that the Administrative Procedure Act works a revision of this well-settled limitation on the judicial power to review quasi-legislative determinations of the type here involved. Cf. *Universal Camera Corporation v. National Labor Relations Board*, No. 40, this Term (quasi-judicial administrative determination). Section 10(e) of that Act (60 Stat. 243, 5 U.S.C. 1009, Appendix A, *infra*, p. 155) provides that

So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall . . . (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law . . .

This standard—whether the action is “arbitrary, capricious [or] an abuse of discretion”—would seem to be the same as the standard of reasonableness established by the many decisions cited above. And it is this standard, described in Section 10(e)’s first category, which would seem applicable to the factual and policy determinations made by the Commission in this case. For, postponing discussion of the fifth category for a moment, the rest of the categories described in Section 10(e) seem clearly inapplicable to the factual and policy questions covered by this Point in our Argument: the second category relates to constitutional issues, the third to statutory issues, the fourth

to procedural issues, and the sixth to issues of fact triable *de novo*.⁴⁵

The fifth category in Section 10(e) contains the only mention of the "substantial evidence" test. It directs a court to set aside agency action found to be

(5) unsupported by substantial evidence in any case subject to the requirements of sections 7 and 8 or otherwise reviewed on the record of an agency hearing provided by statute; * * *

The Commission proceedings here involved were not subject to the requirements of Sections 7 and 8 because, under Section 4(b) of the Administrative Procedure Act (Appendix A, *infra*, pp. 154-155), Sections 7 and 8 apply to rule-making proceedings only "Where rules are required by statute to be made on the record after opportunity for an agency hearing", and the Communications Act of 1934 contains no requirement that rules be so made.⁴⁶

Nor is this a case "otherwise reviewed on the record of an agency hearing provided by statute," within the mean-

⁴⁵ After that part of Section 10(e) quoted in the text, the Section goes on as follows:

* * * (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 7 and 8 or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial *de novo* by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error.

⁴⁶ Section 4(b) of the Administrative Procedure Act, applicable to rule-making, "does not extend present requirements [as to hearings] except to require agencies, in the issuance of substantive rules, to permit at least the submission of written views or suggestions." Explanation in Senate Judiciary Committee Print of the Administrative Procedure Act, in Sen. Doc. No. 248, 79th Cong., 2d Sess., p. 19.

ing of Section 10(e)(B). (5) of the Administrative Procedure Act since, as noted, the Communications Act provides for no agency hearing in "rule making"⁴⁷ and the legislative history of the Administrative Procedure Act makes clear that the "fifth category [in Section 10(e)(B)] necessarily limits the substantial evidence rule to cases in which Congress has required an administrative hearing in which the administrative record may be made." Explanation in Senate Judiciary Committee Print of the Administrative Procedure Act, Sen. Doc. No. 248, 79th Cong., 2d Sess., p. 39.⁴⁸ Nor does the Constitution require a hearing in an administrative rule-making proceeding of the type here involved; consequently such a requirement need not be read into the Communications Act. Cf. *Wong Yang Sung v. McGrath*, 339 U. S. 33.

It would thus seem that the "substantial evidence" rule is inapplicable to the factual determinations here made by the Commission. But whether it is or not is of no great consequence in this case, since the Commission's findings of fact are in any event supported by "substantial evidence on the whole record" and, hence, decisive.

It is not to be forgotten; too, that, factual determinations aside, under the long line of cases above cited as typical of many others, the Commission's policy judgments must stand if they are not arbitrary, and there is no doubt that this rule remains unchanged by the Administrative Procedure Act.

⁴⁷ Where Congress intended the Commission to hold a hearing prior to action, it specifically so provided in the Act. See Section 303(f).

⁴⁸ This explanation was directed at the bill at a time when Section 10(e)(B)(5) was limited to cases required to be heard in accordance with Sections 7 and 8. When Section 10(e)(B)(5) was expanded to its final form, *supra*, p. 43 and note 45, it was given somewhat broader scope but it would seem that it remained inapplicable to cases in which no hearing (with or without a record) was required by statute.

A. The Commission's Findings of Fact Have the Requisite Evidentiary Support.

1. *The appellants' general criticisms of the Commission's findings of fact are baseless.*—Appellants are mistaken in their contention (Br., pp. 57, 73, 81) that the findings adverse to the RCA system were based on evidence taken in earlier portions of the hearing and had been superseded by later developments. The Commission plainly not only had the right to make, but the duty of making, its determination on the whole record, and of deciding which evidence adduced in the early stages remained applicable at the close of the hearings.⁴⁹ The Commission's findings show on their face that in fact it took into account, and dealt with, claimed improvements and developments in the RCA system made in the course of the hearing (e.g., findings relating to receiver equipment and the development of the tri-color tube (R. 127); findings relating to claimed correction of misregistration (R. 139); findings relating to color fidelity (R. 141); findings relating to claims of eliminating dot structure (R. 144); findings relating to network transmissions⁵⁰ (R. 154). Further, the findings in respect of many

⁴⁹ It is to be noted that appellants' claim that RCA's system was so enormously improved that any early evidence concerning it was superseded is squarely at odds with its own claims at the beginning of the hearings. Prior to any demonstration by RCA, its chief engineering witness, after describing the system, testified that " . . . we expect to stand on the performances we give you [at the first RCA demonstration] . . . We will have done all the things we want to do" (Engstrom, Tr. 2768). Similarly, at the very outset of the hearings, RCA had stated that "high standards of performance . . . have been successfully achieved" (Tr. 2557, Engstrom) [italics supplied]. Appellants' present repudiation of the significance of the early demonstrations is hardly consistent with Dr. Engstrom's explicit testimony.

⁵⁰ Appellants (Br., pp. 81-82) particularly criticize, on the ground of supersedure, the Commission's findings and conclusions concerning the RCA system's ability to network its color (*supra*, pp. 13-14, 15-16). Appellants' contention, however, turns on an incomplete paraphrase of the Commission's findings. The relevant findings (First Report, Pars. 119 and 137, R. 154, 161) explicitly deal

of the defects in the RCA system show on their face that they were based on the Commission's own observation at *all* the demonstrations, including the 1950 demonstrations (e.g., small area flicker (R. 134); insufficiency of brightness (R. 137); misregistration (R. 139, 152); color fidelity (R. 141); picture texture (R. 144); impracticability of receivers (R. 152)).

And in any event, there is, in addition to the Commission's own viewing of *all* these demonstrations, ample evidence in the record, adduced *after* the date of the claimed improvements, to warrant the Commission's findings. Thus, appellants, in the Jurisdictional Statement (p. 15), contended that the significant testimony was that adduced in 1950. Yet even if only the 1950 testimony—which begins at Transcript 5998—were considered, it is nevertheless clear that the Commission's findings are supported by the evidence. For, as appears from the transcript references in the Statement (*supra*, pp. 8-14), and as will be shown in more detail below, pp. 53-71), the findings concerning the RCA system are supported by testimony adduced in 1950.

Appellants also contend (Br., p. 56) that in its First Report, the Commission "expressly recognized in connection with the CBS system that further information was required with respect to each of . . . seven performance characteristics"; that in its Second Report, the Commission adopted the CBS system "without taking any further evidence"; and that the findings relating to CBS cannot therefore be said to be supported by substantial evidence. Appellants also advance the related contention that certain

with the April 6, 1950, development by RCA in respect of network transmissions. They show on their face that the Commission made its findings on the basis of the latest developments demonstrated by RCA and not on earlier evidence which had been superseded. See also the discussion below (pp. 67-68) dealing with the substantiality of the evidence supporting the findings concerning RCA network transmission:

of the Commission's findings were based on "speculation and hope" (Br., pp. 55-56, 60, 61).

These contentions, however, involve a mistaken reading of the Commission's findings. While in respect of a number of possible future developments which might be embodied in the CBS system or in apparatus associated therewith, the Commission did note the desirability of additional testing and information concerning their effect upon CBS performance (e.g., horizontal interlace; the utilization of long persistence phosphors; the tri-color tube (*supra*, pp. 23-24)), the Commission explicitly found and concluded that in each instance the CBS system was satisfactory for adoption even without such improvements and developments (R. 166); see also, e. g. (R. 136) (brightness); (R. 144) (sharpness of picture); (R. 163) (flicker); (R. 163-4) (geometric resolution). The desirability of additional information concerning the possibility of future improvements in matters already found to be satisfactory, therefore, obviously does not rob the findings concerning *present* performance of their validity. Thus, appellants' contention that the Commission's determination was in the face of a recognition of the necessity for further evidence or was based on "speculation and hope" is squarely refuted by the Commission's Reports.

Had the Commission adopted the CBS system on the finding that its present characteristics were not satisfactory, but that later developments would lead ultimately to a satisfactory system, the Commission would, indeed, have pitched its determination on "speculation and hope." But the Commission clearly did not do so. On the contrary, in its Second Report, the Commission explicitly stated that its decision rested on its conclusion that CBS "meets all of the criteria for a color system" (R. 415). Hence, it is clear that the Commission's findings and conclusions were not based on speculation and hope, but on concrete evidence concerning the satisfactory nature of what was then in existence.

Appellants have also contended (Br., pp. 14, 19-22) that the Commission's findings and conclusions are invalid since the Commission rejected the testimony of "responsible" industry experts and accepted the testimony only of CBS, CTI and FCC witnesses. The contention is mistaken both as a matter of fact and as a matter of law. As readily appears from the Statement, *supra*, and from the discussion below in Point IA2, in almost every significant instance, the findings of the Commission which were adverse to the RCA system as well as those which were favorable to the CBS system find support in the testimony of the witnesses whom appellants, in the court below, identified as "responsible" industry experts.⁵¹ (R. 589).

In any event, even had the Commission accepted the testimony only of witnesses called by CBS, CTI and the Commission itself, no error would have been involved. The selection among conflicting testimony of different witnesses is a task particularly within the province of the administrative agency. It is settled that it is not error even if an agency rejects—as the Commission here did *not* reject⁵²—

⁵¹ These asserted experts are identified as DuMont, Fink, DeForest, T. T. Goldsmith, D. B. Smith, Baker, Engstrom and Brown (the latter two being RCA officials). Their names appear frequently in the citations in the Statement, *supra*. Further, it is to be noted that many of the witnesses for CBS were neither officials nor employees of CBS but were independent manufacturers (Mulhern, Cushway, Kohnner, Hamilton, Cogan, Easton, Gross, Kay, Schubert, Shapp, Sparklin), Government experts (Judd, Bureau of Standards; Frazer—Navy Department), independent public opinion or research experts (Dunlap, Riley), or officials connected with other companies unrelated to CBS (DuBarry).

⁵² It is true that, in general, the witnesses representing manufacturing interests favored a *type* of system like that proposed by RCA, and opposed the CBS system as incompatible. These witnesses did not, however, favor the adoption of RCA standards now (see, e. g., Tr. 7962-3, 8093 (Fink); Tr. 8203, 8245, 8249, 8270 (D. B. Smith); Tr. 9956 (T. T. Goldsmith); Tr. 9687 (Baker); Tr. 9380 (DuMont)). Rather, in testifying to their recommendations and opinions, they expressed greater optimism concerning some of the future developments of the RCA system than the Commission ultimately found was warranted. But their optimism was

all the testimony of one party, and accepts that of the other party. *National Labor Relations Board v. Pittsburgh S. S. Co.*, 337 U. S. 656, 659; see also *United States v. Yellow Cab Co.*, 338 U. S. 338, 341.

In addition, appellants, throughout their discussion of the issue of the presence of substantial evidence to support the Commission's findings concerning the CBS system, appear to argue that such findings lack substantial evidence because, in 1947, the Commission refused to adopt standards for an earlier and different version of the field sequential system.⁵³ At the threshold, it would seem clear that the fact that the Commission previously had reached a different conclusion, in different circumstances, on different evidence, and in respect of a different though related color system, does not affect the substantiality of the evidence supporting its findings in the instant case concerning the present field sequential system.

based on their favoring a compatible system and opposing an incompatible one (e.g., Tr. 8294 (D. B. Smith)). In any event, the Commission was on sound ground in its skepticism concerning evaluations of the RCA potentials by these witnesses. As it stated in its First Report (R. 159):

The Commission is aware that of necessity it must rely to a great extent upon industry experts for data and expert opinion in arriving at decisions in the field of standards; our own facilities are too limited to gather much of the data. However, the responsibility for decision is that of the Commission and we cannot feel bound to accept recommendations and expert opinions when we find from a study of the record that the record supports different conclusions. *Moreover, the testimony of many of the parties was not based on field testing conducted by them or upon an analysis of field testing made by others but were simply recommendations and expert opinions of a general nature. In weighing these recommendations and expert opinions we cannot overlook the fact that many of these same parties offered recommendations and expert opinions of the same kind as the basis of their advocacy in the 1946-1947 hearing [the transcript of which was incorporated into the transcript of the instant hearing] of the [RCA] simultaneous system—a system which never survived field testing [italics supplied].*

⁵³ FCC Report, March 18, 1947, 11 F.C.C. 1523 (R. 458).

But, in any event, analysis of the Commission's 1947 decision readily establishes that the conclusions there reached do not tend to undermine the findings made by the Commission in this case. In summarizing its reasons for rejecting the field sequential system in 1947, the Commission stated at that time (11 F. C. C. at 1525-6; R. 461-2):

Before approving proposed standards, the Commission must be satisfied not only that the system proposed will work, but also that the system is as good as can be expected within any reasonable time in the foreseeable future. In addition, the system should be capable of permitting incorporation of better performance characteristics without requiring a change in fundamental standards. Otherwise, the danger exists that the standards will be set before fundamental developments have been made, with the result that the public would be saddled with an inferior service, if the new changes were not adopted, or if they were adopted, receivers already in the hands of the public would be rendered useless.

Judged by the foregoing test, the Commission is of the view that the standards for color television proposed by Columbia Broadcasting System should not be adopted. In the Commission's opinion the evidence does not show that they represent the optimum performance which may be expected of a color television system within a reasonable time. The Commission bases this conclusion on two grounds. In the first place, the Commission believes that there has not been adequate field testing of the system for the Commission to be able to proceed with confidence that the system will work adequately in practice. Secondly, the Commission is of the opinion that there may be other systems of transmitting color which offer the possibility of cheaper receivers and narrower band widths that have not yet been fully explored. * * *

In thus discussing the various characteristics of the field sequential system as it was proposed in 1947, the Commission in its 1947 decision adverted to the conflict in the testimony of the witnesses concerning such matters as the

adequacy of picture brightness, the problems of flicker, and color breakup, and the issue of receiver design. In its discussion of each of these issues, the Commission concluded that insufficient tests had been made, reproducing normal conditions, to permit the Commission definitively to decide how serious these problems were.

It is plain that the essence of the decision in 1947 was first, that there should be more time allowed for new systems which would occupy less channel space and would involve less costly receivers and second, that there had been a failure of proof because of inadequate testing and experience. There was no such failure in 1950. Both difficulties were remedied by 1950. The CBS system had been reduced from 16 mc. channel space to 6 mc. channel space—the same as the present black and white system, and the cost of receivers was shown to be reasonable (*supra*, pp. 21, 22). And, too, the failure of proof in 1946-1947, arising out of inadequate testing and experience had also been remedied by 1950. For on each of the issues which troubled the Commission in 1947, it found on the basis of the 1949-1950 hearings that the evidence was entirely adequate to permit it to conclude, as it did, that the CBS system was satisfactory in all respects. It also concluded that there had been adequate field tests of the field sequential system to permit it to reach these decisions. And finally, by 1950, the Commission had sufficient experience and sufficient evidence before it to put at rest the doubts which it had in 1947 as to whether the field sequential system was "as good as can be expected within any reasonable time in the foreseeable future." For by 1950, as has been seen, the Commission was able to determine, as it did, that no other system performed satisfactorily and none had assured promise for the future.

Clearly, in these circumstances, the existence of Commission doubts in 1947 leave unaffected its explicitly supported resolution of doubts in 1950.

Appellants' broad attacks concerning the substantiality of the evidence supporting the Commission's findings are, accordingly, clearly wide of the mark.

2. *The appellants' specific criticisms of the Commission's findings of fact are baseless.*—Those who, like appellants, undertake to attack administrative findings for which, as appears from the Statement above, there is such clearly supporting evidence, must assume the burden of establishing that such evidence lacks substantiality. See *e.g.*, *North Whittier Heights C. Ass'n v. National Labor Relations Board*, 109 F.2d 76, 83 (C. A. 9), certiorari denied, 310 U. S. 632. This they can successfully do only if they establish either that the evidence cited in support of the findings does not in fact support them or that the evidence cited in support of the findings is so weakened and sapped of its force by qualifying, impeaching or contradictory evidence elsewhere in the record, which must be accepted, that the evidence cited in support is robbed of its substantiality. Where, as here, it so abundantly appears that each finding is squarely bottomed on precise and explicit evidence—usually of a number of witnesses wholly independent of each other—it is not enough to assert merely that there is other evidence elsewhere which, if accepted, might have justified different findings.

Particularly in the light of the teaching of the *Universal Camera* case, *supra*, it is imperative as a matter of appropriate judicial administration that, before reviewing courts are subjected to the burden of analyzing all the evidence in the record to determine substantiality, at least a *prima facie* showing be first made by those who attack the findings. And such a *prima facie* showing can be made in a case such as this, where there is such explicit evidence to support the findings, only by pointing to contrary evidence which must be accepted and which raises doubts concerning the evidence which would otherwise furnish the necessary substantial foundation for the findings. This appel-

lants have not done; indeed, they have not even referred to the supporting evidence at all, and hence they must fail at the threshold. But in any event, as will be shown, the supporting evidence is explicit, and its strength is unaffected by the fragmentary citations upon which appellants depend.

(a) FINDINGS CONCERNING RCA

*RCA color fidelity.*⁵⁴ Appellants contend (Br., pp. 69-74, 107-108) that there is insufficient support for the Commission's findings (First Report, Par. 87, R. 141) that (1) at all of its demonstrations on the record, RCA had difficulty producing a picture with adequate color fidelity; and (2) the difficulty arose from factors which are a part of the system, such as registration (see *supra*, pp. 9-10), the critical nature of the color control and the utilization of mixed highs and cross-talk (see *infra*, p. 56, note 61). These findings, however, are overwhelmingly supported by the evidence in the record⁵⁵ including the Commission's viewing of the demonstrations.

In respect of RCA color fidelity as demonstrated, the record is replete with testimony commenting adversely thereon (Tr. 5664, 5666 (DuMont); Tr. 5219, 5452, 5455, 9926 (T. T. Goldsmith); Tr. 4765 (McIntosh); Tr. 8460, 10640 (Chapin); Tr. 3570-2, 8880-2, 9268, 9285-7, 11205-7, 11242-6 (Goldmark); Tr. 8610 (Stanton); Tr. 3750-1, 3753, 3785, 9313 (Judd); Tr. 3803-4 (DuBarry); Tr. 5943, 5947-8, 5954, 5962, 6254 (Murphy)). These comments establish not only specific aberrations but also seri-

⁵⁴ It should be noted at the outset that in their discussion of specific findings, appellants have not set out the findings but, rather, have paraphrased them. These paraphrases often do not accurately reflect the complete findings.

⁵⁵ To the extent that appellants' attack on these findings hinges on their contention that the testimony was superseded by later developments or was that only of CBS, CTI and FCC witnesses, the attack, as has been shown above (pp. 48-49), must fail.

ous color contamination and gross color distortion.⁵⁶ Typical comments, embodied in testimony adduced in April 1950, and concerning RCA performance *during the later phases of the hearing*, are set out in the margin.⁵⁷

⁵⁶ At several of the official demonstrations, RCA engineers themselves admitted lack of color fidelity in particular pictures (Tr. 3374 (Kell); Tr. 8132 (Engstrom); Tr. 5965-6, 5976 (Brown)). Further, the record reflects comments of several of the Commissioners remarking on lack of color fidelity in the RCA pictures (Tr. 5965, 10733-4, 11192-3).

⁵⁷ Typical comments are as follows:

Dr. Goldmark, testifying concerning the performance in late April 1950, of one of a number of RCA receivers placed by RCA in the homes of Commissioners and Commission officials (Tr. 11242-6):

When the color program came on, it . . . was a multi-colored record and was followed by an announcer whose face appeared vividly green.

The color phasing knob was still in the same position as left by the service people, and since I had doubts this was the natural color of the announcer, I proceeded, with the permission of my host, to readjust the color phasing knob.

I found that when my hand just barely came into contact with the knob rainbow stripes appeared all across the picture, which was evidently the sampling oscillator losing complete synchronism.

After a while, I learned to move the knob ever so gently, by which time the scene changed already and somebody was playing an instrument which I could not yet identify by its color. Someone behind me said, 'Oh, a purple piano'.

I finally managed to stabilize the colors, and the nearest thing to skin tone I could put on the organist's face was purple. Whereupon, the instrument which by its tone identified itself as a Hammond organ, became purplish red.

Each of the organist's hands, because of stationary color fringing at the color [*sic*, camera?], showed more than five fingers all in different colors.

The outline of the organ, on one side, showed very broad, deep purple fringes, again because of camera mis-registration.

non-uniform color over the surface was evident.

While the face of the organist was very purplish, the face of the announcer was yellowish, and around his eyes greenish.

Dr. Judd, in charge of research in colorimetry, National Bur-

In order to negate this testimony concerning the RCA color fidelity as actually demonstrated, appellants have cited (Br., pp. 70-71, 72) a few isolated comments which are without significance. Four of the citations refer to comments by two of the Commissioners. Two of these Commission comments (Tr. 6139, 8516) refer only generally to the RCA picture, without mention of color; the other two (Tr. 6130, 6900) obviously referred to specific and momentary instances of reasonable color;⁵⁸ and in any event both these Commissioners joined in the very findings concerning RCA color fidelity which appellants now attack. Two of the other citations (Stanton, Tr. 8611, Goldmark, Tr. 8882) related only to improvements in RCA color as the hearings progressed: The context of their testimony makes abundantly clear, however, that even with the improvements, the witnesses were of the opinion that the color still fell far short of reasonable quality (Stanton, Tr. 8610-1;⁵⁹ Goldmark, Tr. 8880-8882; see also excerpt quoted

eau of Standards, Department of Commerce, testified late in April 1950:

The color pictures shown by RCA and the CTI system have been occasionally good and occasionally bad [Tr. 9313].

I think however that the degree of color distortion, which I have seen in the [RCA] demonstrations is so great that many other things have been [sic] done before trying to pick up this last 10% maybe [Tr. 9317].

⁵⁸ Neither these comments nor the testimony of Dr. Judd, cited by appellants and discussed below, p. 56, in any event affect the Commission's finding, which was that "color fidelity of a high quality was not *consistently* achieved at any of the demonstrations on the record" (First Report, Par. 87, R. 141) (italics supplied). The Commission also found (First Report, Par. 87, note, R. 141) that sporadically and in particular scenes, RCA had achieved reasonable color fidelity:

⁵⁹ It is to be noted that Mr. Stanton explicitly limited his comment to agreeing that "there was a substantial improvement, if you will, *only because the pictures were stable as far as their colors were concerned*" (italics added to indicate portion of quotation omitted by appellants); in the course of the same colloquy, Stanton testified that he did not believe that the pictures had color fidelity (Tr. 8610-1).

in the margin, p. 54, *supra*). Appellants further cite a comment (Br., pp. 70, 108) by Dr. Judd that at a demonstration he had seen at the Bureau of Standards, RCA "was the equal of any of the CBS shows on color fidelity" (Tr. 9314). At the same time, however, he testified (Tr. 9313) that the RCA color pictures were erratic, having been "occasionally good and occasionally bad" (Tr. 9313) and that the degree of RCA color distortion was very great (Tr. 9317). In any event, Dr. Judd's comment cited by appellants refers not to an official demonstration, but a demonstration specially conducted under the supervision of RCA experts, not witnessed by any of the Commissioners, and the conditions or subject matter of which do not appear in the record⁶⁰ (Tr. 9314-5).

The foregoing readily establishes that the Commission's findings concerning the quality of RCA's color fidelity as demonstrated are overwhelmingly supported by the evidence in the whole record.

The Commission's findings concerning the difficulties of curing these defects and their inherent nature—findings which, it may be noted, are within their special expert competence—are similarly supported. Thus there was testimony that because of the inherent complexity of the RCA system, and the consequent critical control involving a maximum permissible tolerance of 7 one-billionths of a second in the timing of the RCA color wave which represents the color information, loss of color fidelity, or even inversion or complete loss of color, can readily result (Tr. 4763-5 (McIntosh); CTI Ex. 273, Tr. 4817); that cross-talk⁶¹ in the RCA system causes loss

⁶⁰ The only other reference by appellants to RCA color fidelity as demonstrated (rather than to theoretical potentials) is to a comment of the Condon Committee that RCA color was "substantially as faithful" as Kodachrome photographs (Br., pp. 71-72). The Condon Committee Report, of course, was not a part of the record before the Commission (see *infra*, pp. 130-132).

⁶¹ Cross-talk is the intermixture of dots of one color with dots of another color caused by the signals of one color leaking over into the signals of another (Tr. 7638).

of color fidelity⁶³ and its presence raises grave question whether the colors of objects of a width of three-eighths of an inch or less on a 12 inch screen can be produced faithfully (Tr. 11205-6 (Goldmark)); that the use of "mixed highs" in the RCA system, which results in transmitting the fine detail in shades of gray, rather than in color (RCA Ex. 209, Tr. 2960; see also Tr. 7637-41 (Brown)), may be a source of lack of color fidelity in fine detail (Tr. 11218 (Goldmark)); and that misregistration (the inherent nature of which is discussed below, pp. 60-61) is also a cause of serious color contamination and lack of fidelity⁶³ (Tr. 2073 (Fink); Tr. 3121 (Goldmark)).⁶⁴

Appellants' citations (Br., pp. 71-72) on the issue of the potentials of RCA color fidelity fail to establish that the Commission's findings were in error. At most, the citations to the testimony of Fink, Lippincott and Goldsmith tend to show only that, as a matter purely of ultimate theoretical considerations, and wholly aside from the problems of apparatus associated with the system (see Tr. 2014, 2018-20), RCA's color fidelity difficulties might be overcome. But there is nothing in the record to show that appropriately correcting apparatus can be produced,⁶⁵ and if it can, when it can be produced or at what

⁶³ This fact was conceded by Dr. Brown, RCA's own engineer (Tr. 7638, 7709). See also Tr. 7637-41 (Jensen).

⁶³ For a detailed description of the effects of misregistration in RCA color fidelity; see Tr. 3571-3, 11243-6 (Goldmark); see note 57, *supra*, p. 54.

⁶⁴ Other sources of color difficulties in the RCA system include the effect on color saturation of inadequate frequency response in the color receiver (Tr. 3155, Goldmark); and the requirement of matching three tubes at the camera, and maintenance of such matching despite the likelihood of uneven deterioration (Tr. 3155, 3156, 9267, 11206 (Goldmark)).

⁶⁵ For example, Goldsmith's testimony concerning the RCA potential assumed the use of "negative lobes" for masking purposes in order to give RCA a high color fidelity potential (see Tr. 9926 (T. T. Goldsmith)). Apart from the fact that it is exceedingly doubtful that such process is usable with the RCA system (Tr.

cost. Beyond this, appellants point only to testimony to the effect that the RCA system improved during the course of the hearings (Br., p. 70). There is no controversy about this; the Commission found only that RCA's potential appeared to be limited and that its realization at the close of the hearing was unsatisfactory.⁶⁶ In any event, even if the evidence were in conflict on this issue, it is peculiarly one for the expert resolution of the Commission; the Commission's refusal to accept at face value the predictions and theoretical analyses of the witnesses cited by appellants is clearly not error, particularly in the light of the clear and explicit testimony to the contrary.

RCA picture texture. Appellants criticize (Br., pp. 74-75) the Commission's findings (*supra*, p. 11) concerning the "soft" quality of the RCA picture and the presence of dot structure. In respect of the elimination of dot structure without thereby incurring other disadvantages, the Commission expressed doubts. These findings are clearly supported by the requisite evidence.

The testimony in the record establishes the soft quality and lack of contrast in the RCA pictures (Tr. 3166, 3579, 9293, 9279, 9301-2, 11206, 11213 (Goldmark); Tr. 9457-8 (DuMont); Tr. 10640, 10668 (Chapin)). This lack of con-

11206-7), RCA itself never proposed the process and the record is devoid of any indication that such a device has ever been developed, or is being developed, for use with the system. In the circumstances, the Commission was hardly required to lay great hopes upon such theoretical and non-existent developments.

⁶⁶ Appellants' assertion (Br., p. 72) that the Commission's findings concerning the potentials of RCA's color fidelity "reflect testimony by CBS" is misleading. As already noted, the findings also found support in the testimony of non-CBS witnesses as well as in the Commission's own expert analysis. And Goldmark's testimony cited by appellants concerning RCA's possibility of improvement is torn out of context. When considered in context, it raises no question of his credibility or the reliability of his analyses (see Tr. 8878-8884).

trast arises not only from inadequate brightness (*supra*, p. 9), but also from the contrast difficulties stemming from the dot composition of the RCA picture (Tr. 6084; see also Tr. 8107-8).

That dot structure was present in the RCA pictures is also established by the testimony (see transcript citations, *supra*, p. 11); there is no unequivocal contradictory evidence in the record.⁶⁷ As Mr. Chapin, an FCC witness testified (Tr. 10656), dot structure "is probably basic in the system so far as equipment that we have positive knowledge of being available." While, in the testimony partially quoted by appellants (Br., p. 75), Chapin did state that it might be possible ultimately to devise apparatus to eliminate such dot structure, in the portion of his testimony omitted by appellants, Chapin testified that such elimination would involve color contamination (Tr. 10656; see also Tr. 9232, 11217). Nor is there substantial contradiction of this testimony supporting the finding that while elimination of dot structure may be possible, its obviation would be at the risk of further loss in color fidelity, resolution or contrast. Indeed, in the comments which RCA submitted to the Commission after the issuance of the First Report, RCA in effect conceded this risk, stating that "Visible dot struc-

⁶⁷ The only witnesses who even attempted to show that dot structure was not visible were RCA officials and their testimony was not unequivocal. General Sarnoff testified that he had seen no dot structure, but if there were such, the remedy would be for the viewer to "sit a little further" from the receiver (Tr. 10069, 10071). Dr. Brown apparently conceded that at least in pictures involving pure primaries, the dot structure was visible, and that "I don't mean to imply at all that the dots disappear" at a point where the viewer is at a distance from the receiver at which the normal line structure would become invisible (Tr. 7746, 7752-3). Dr. Engstrom testified that the line structure normally seen in any television picture when the viewer is close enough tends to disappear before the dot structure disappears as the viewer draws back "a little bit" (Tr. 6089).

ture can be eliminated without *appreciably* impairing contrast or resolution"⁶⁸ (R. 325) [*italics supplied.*]

In addition, appellants do not even advert to the Commission's findings (First Report, Pars. 83 and 133, R. 139, 159), that a major source of the unsatisfactory nature of RCA's picture texture was misregistration, and that such misregistration is a severe problem and was apparent at all RCA demonstrations in the record. These findings, thus left unquestioned by appellants, are overwhelmingly established by the record (see citations to testimony, *supra*, p. 9).⁶⁹

Not only did the Commission find that misregistration is a problem and that it was apparent throughout, but it concluded (First Report, Par. 133, R. 159) that it "is difficult to see how these defects can be eliminated." There is convincing evidence on which the Commission could properly rely for its conclusion,⁷⁰ which, in any event, appellants have not attacked in this Court.

⁶⁸ Similarly, Dr. Brown, RCA's own witness, testified that one possible method of eliminating dot structure had not been demonstrated because of its added complexity (Tr. 10750); he also conceded that the circuit which he had suggested would also eliminate mixed highs in that region and hence cause loss of resolution (Tr. 10753).

⁶⁹ A detailed description of the effects of misregistration on the RCA picture appears at Tr. 3571-3, 11243-6 (Goldmark). For a comprehensive analysis of the problem itself, its causes and effects, see Tr. 3121-4 (Goldmark), CBS Ex. 212, Tr. 3460.

⁷⁰ See Tr. 3099, 3119-25, 3133-5, 11200-4 (Goldmark); Tr. 9380 (DuMont); Tr. 11478-80 (Lippincott). Lippincott, a witness for CTI, testified that so far as apparatus was concerned, no development had been presented to the Commission, either for RCA or CTI, upon which the Commission could rely with confidence in finding that a practical method of registration had been achieved at the camera (Tr. 11481).

The problem of registration is accentuated for an RCA camera used for outdoor televising—a camera which was never shown by RCA during the hearings (*supra*, p. 13). An outdoor camera is frequently moved and subject to much rougher treatment than a studio camera; hence misregistration is even more likely in such a camera (Tr. 11202, Goldmark; Tr. 11480, Lippincott).

It may also be noted that while RCA claimed that a camera using only a single tube, instead of the present three tubes, would solve

RCA receiving equipment. The Commission's findings concerning the complexity, impracticality and cost of RCA's receiving equipment (*supra*, pp. 12-14) are explicitly and firmly supported by the testimony cited above (*ibid.*). The RCA receivers utilizing dichroic mirrors and three kinescope tubes were dismissed by various witnesses as wholly impractical for ordinary use.⁷¹ Thus Dr. DuMont, one of the witnesses described by appellants as a "responsible" industry expert, testified that "the three tube proposition isn't practical from the standpoint of cost, size, and the small angle of viewing" (Tr. 9377); Col. Lippincott similarly testified (Tr. 11512) that the RCA three kinescope receiver "is too delicate; the field of view is too restricted; it is too expensive . . . I cannot conceive of it being . . . sold" to the public as a "commercial possibility or probability of practical use." The difficulties of successfully operating this type of receiver are described in detail in the record; such receivers required constant adjustment, even during official demonstrations when they were under the control of trained RCA technicians (Tr. 3363, 5943-4, 8459-61, 8487, 9285, 10647, 10868, 11292-3, 11242-3, 11245, 11257, 11512, 11657). Indeed, RCA itself in effect conceded the impracticality of these receivers; its own official testified that the single tri-color tube receiver was

the registration problem at the transmitting end, RCA admitted it was still "trying to learn" how to devise such a camera (Tr. 7585). And a single tube camera in any event precludes the use of the "mixed highs" which are an integral part of the RCA system (Tr. 9297, 9298-9, 11252-4, Goldmark).

⁷¹ The original version of the RCA three kinescope receiver had "something over a hundred [vacuum] tubes" (Tr. 7805); the "simplified" version shown later had 64 such tubes (Tr. 6065). Later, an RCA witness prophesied that "in not too many weeks" RCA would have a three kinescope receiver with 36 or 39 tubes (Tr. 8543), but no such receiver was ever shown, nor did RCA's witnesses ever testify that this reduction had in fact been accomplished. It may be noted that a normal black and white receiver has about 22 vacuum tubes (Tr. 11230-1).

the "missing link" and the "key" to practical home television⁷² (Tr. 7913-4).

Necessarily, therefore, appellants must rely on RCA tri-color tube receivers in order to establish any error in the Commission's findings concerning the defects of RCA's receiver equipment. But each of the findings on this score are firmly supported. There is testimony that the tri-color tube is not free from registration difficulties (Tr. 11203). Indeed, at the single demonstration of the tube by RCA, misregistration was apparent and it could not be established whether the fault lay at the camera or at the receiver, or both (Tr. 11202). Further, the evidence establishes without contradiction the presence of a number of defects in the tube as demonstrated.⁷³ There is also explicit evidence that even with the tri-color tube, the RCA receivers are, because of the inherent complexity of the RCA system and its requirements for higher tolerances, likely to be more complex and costly than CBS receivers (Tr. 11230-2, 11263-6; see also Tr. 8234, 8237-8, 8262-6, 8280).

Particularly since, as the Commission noted (First Report, Par. 116, R. 152), the tube was a last minute development, had been demonstrated briefly and only once, had not been made available to other parties or the Commission's laboratory for study (Tr. 7917, 7920), and concededly required further development (Tr. 7843, 7848, 7928, 10872; cf. Tr. 11485), the evidence plainly supports the Commission's doubts in respect of whether the RCA tri-

⁷² Compare the testimony of the Chairman of RCA's Board of Directors concerning the commercial feasibility of RCA's three-tube receiver: "... you can always sell a little of anything ..." (Tr. 10066).

⁷³ The defects noted in the testimony were lack of brightness (Tr. 9279-80, 11228, 11257-8); insufficient resolution (Tr. 7843, 7927); and presence of a moire pattern (Tr. 8138, 8162, 9379, 9931, 11216-7).

color tube is an "assured fact"⁷⁴ (Tr. 9280, 9922, 9924, 11334-5, 11273-4). Indeed, Dr. DuMont testified in response to the question whether the Commission could "rely with confidence" on the tube's ultimate development as usable in a commercial receiver (Tr. 9376), "... the proof of the pudding is the final result, and I would not necessarily say that you could rely upon it at this stage of the art". And the Chairman of the Board of Directors of RCA himself testified that if some other organization had developed the tube, he would require much more demonstration before he would be ultimately satisfied than if his own company developed it (Tr. 10077).

In the light of the foregoing evidence, the Commission's findings and conclusions on these issues are plainly supported by substantial evidence. It is true, as appellants emphasize so heavily, that some witnesses were more optimistic about the potential future performance and availability of the tube, and some believed that an RCA receiver using such a tube would be simple and of the same relative cost as a CBS receiver.⁷⁵ But citation to such testimony

⁷⁴ Particularly because RCA would not disclose how a tri-color tube could be manufactured (Tr. 7917, 7920-1); it was manifestly impossible for the Commission to reach any definitive conclusion either that the tube could be mass-produced (as distinguished from produced by hand) or how much it would cost. In these circumstances, the Commission's expression of doubts were wholly justified, if not in fact compelled.

⁷⁵ Appellants' reliance on the Chapin testimony, which they cite (Br., p. 76), is hardly justified. Chapin testified only that "*I am not clear that there is much significant difference*" between RCA and CBS on the issue of receiver complexity (Tr. 10632, italics supplied). The reasons for his lack of clarity are evident: His testimony was in response to a request that he compare the RCA tri-color tube receiver demonstrated on April 6, 1950, with a CBS receiver utilizing horizontal interlace, demonstrated on April 26, 1950 (Tr. 10631-2). The RCA tri-color tube had been demonstrated only once and, as the Commission noted (First Report, Par. 116, R. 152), had not been made available to the Commission's laboratory for study. Similarly, the CBS horizontal interlace receiver had been demonstrated only once and was, in any event, a

merely establishes the existence of a conflict. Particularly in an area involving actual observation as well as judgments *in futuro* based on technical analysis, these findings, explicitly supported as they have been shown to be, are decisive.

It should be further noted in this connection that while RCA's witness conceded that the tri-color tube was the "missing link" in its system (*supra*, pp. 61-62), the ultimate development of a tube which is successful and can be mass-produced at a reasonable cost would at most reduce some of the complexity of the RCA receiver and may also reduce the registration problem at the receiver (*supra*, pp. 9, 12, 62). But the tube, if and when developed, leaves unaffected the basic deficiencies which the Commission found to exist in the system—its inherent complexity, its high cost of operation, its lack of color fidelity and poor picture texture, and its susceptibility to oscillator radiation interference (*supra*, pp. 14-15). Thus it is obvious that the successful development of the tube still would not qualify the RCA system under the Commission's criteria.⁷⁶

laboratory model (Tr. 9575, 9591). The Commission's findings concerning CBS receivers, of course, related only to disc receivers without horizontal interlace, since those with horizontal interlace had not been proposed by CBS (see *supra*, note 21, p. 17).

In these circumstances, it was obviously impossible for Chapin to make a meaningful comparison between two such recent types of receivers.

⁷⁶ This, of course, is the fundamental difference between the effect of the successful development of the tube on RCA, on the one hand, and on CBS, on the other. The CBS system was found to meet the Commission's criteria *without the tube*. The successful development of the tube would provide a means to free CBS of the present direct-view picture size limitation (*supra*, pp. 20-21, 22-23) and permit the use of a so-called "all-electronic" receiver instead of a disc receiver. Thus appellants cannot at the same time contend that the Commission was wrong in finding that the tube is not an "assured fact" and also contend (see *infra*, pp. 74, 87) that, nevertheless, the CBS system is bound by "mechanical" disc receivers and limited direct-view picture sizes.

RCA transmitting equipment. The camera used by RCA uses three image orthicon tubes and a system of dichroic mirrors; it is in effect three cameras in one housing (Tr. 2812-4; Ex. 209, pp. 1-2, Fig. 1, Tr. 2960). It was characterized by Donald Fink (identified by appellants as a "responsible" and "independent" expert (R. 589) as "complex" (Tr. 7970), while D. B. Smith, another "responsible" expert, expressed doubts that such a camera could ever be sold commercially. (Tr. 8244). Each of the three tubes in the camera must, in order to produce proper color fidelity, perform identically at all times in image size, image shape, gamma characteristics, contrast range and shading; such a requirement is "a tremendous burden" (Tr. 9296). The evidence establishes that because of the complexity of the camera and its need for three perfectly matched pick-up tubes, and because of the difficulties of maintaining registration and color fidelity, the tube costs alone of maintaining only four cameras by a station would exceed tube costs for black and white operations by \$120,000 a year; additional costs are inevitable because of the need for added personnel and extra maintenance to operate the studio equipment (Tr. 3214-5, 11232-3). Further, the testimony shows that because of the inherent complexity of the RCA system, and the need for precise accuracy, proper performance "can be maintained under ideal conditions" but "it is very difficult to maintain them under normal operating conditions . . . the difficulty of maintaining the necessary adjustments with the exactitude with which they must be maintained in order for the RCA system to work has led me to believe that as an engineering problem it was one that was likely to be met with failure to maintain the exactitude, at least as often as it was with success, and particularly in marginal areas and under the day-to-day operating conditions it has always struck me as being substantially an impossibility" (Lippincott, Tr. 11470-1).

⁷⁷ The exacting requirements of the RCA system were described by an independent consulting engineer, testifying for CTI, as in-

The camera problems would be aggravated in respect of field or remote pick-up cameras—which are used not in the studio under constant supervision but outdoors and other places away from the studio to televise sports and public events. Field cameras require added compactness and ruggedness (Tr. 11202, 11480). Yet RCA never demonstrated such a camera; nor were any remote pickups demonstrated by it in the course of the hearings⁷⁸ (Tr. 9352), and, in their brief, appellants do not contend otherwise.

While an RCA witness testified that a single tube camera could be developed, he admitted that “for the time being”, RCA contemplated continuing to use the three-tube camera (Tr. 6180). In any event, he testified (Tr. 7585) that the single-tube camera was still in the “research stage”, which he defined as the stage at which they “are trying to do it in the first place”; they had not yet reached the development stage in which “you are trying to make it work.”

But the evidence also establishes grave doubts whether such a single-tube camera can be successfully built for the

volving a maximum permissible tolerance in timing of seven one-billionths of a second—tantamount to hitting a 400 foot target on the sun 93,000,000 miles away (McIntosh, Tr. 4767).

As a result, according to Mr. McIntosh, the normal station transmitter is not adequate for broadcasting under the RCA system; he testified (Tr. 4765-6):

In this connection, it seems highly significant that Dr. Brown [an RCA engineer] testified that the output circuit of station WNBW had had to be retuned in order to transmit color under the RCA system. That station is owned by the National Broadcasting Company, the technical standards of which are as high as those of any company in the industry but in spite of this fact the WNBW transmitter was apparently not in sufficiently good adjustment to meet the requirements of the proposed RCA color television system.

⁷⁸ An RCA witness testified at the opening of the hearings in the Fall of 1949 that RCA has begun development of a remote camera which would be ready the following Spring (Tr. 2718, 2818). The camera was never reported as having been completed, and it was never shown.

RCA system. The problem was described as "fantastically difficult" (Tr. 11253) and even if it could be successfully built it is doubtful that it could transmit mixed highs, which are an essential of the RCA system. (Tr. 9296; see also Tr. 9298-9, 11252-4.)

Appellants, in their brief (pp. 79-80), seek to undermine the Commission's findings on this score only by reference to statements by RCA's own witnesses that no difficulties had been encountered by RCA in operating its station equipment, to an isolated statement by another witness that RCA had "... done a wonderful job ... with their color cameras", and to an argument that station costs are not important in any event.

It is too plain for discussion that the evidence described above amply supports the Commission's findings and conclusions concerning RCA station equipment, and that the contrary evidence cited by appellants is wholly insufficient to establish the invalidity of the Commission's findings and conclusions.

RCA network transmission. Appellants' also attack (Br., pp. 81-83) the Commission's finding (First Report, Par. 119, R. 154) that "Further testing" is necessary "before a final judgment can be made" in respect of the RCA system's ability to transmit color over 2.7 megacycle cable for networking purposes (see *supra*, p. 13), as well as the Commission's conclusion (First Report, Par. 137, R. 161) that "there is not adequate assurance on this record that color pictures can be transmitted over the 2.7 megacycle coaxial cable facilities." These findings and conclusions, peculiarly within the competence of the Commission to make since they involve a judgment as to the quantum of actual performance which is necessary to provide assurance of an accomplished fact, are plainly justified by the record.

The record shows that throughout the initial phases of the proceedings, RCA was unable to transmit color over

2.7 megacycle cable; the color was lost in the process and was received as black and white (Tr. 2718, 5964). Toward the close of the hearing, RCA claimed to have developed a method of obviating this difficulty, and on April 6, 1950, it conducted a single brief demonstration (Tr. 8140-4). The demonstration did not, however, actually utilize the cable, but merely "simulated" its use (Tr. 8141-2). RCA's witness testified that it had actually used the cable only twice (Tr. 8142); he also testified that RCA had made no color measurements on the effect of the intensities of the cable since the method of thus transmitting RCA color over the 2.7 megacycle cable "is too new" (Tr. 8152). He also stated that further field test of the operation was planned (Tr. 8144).

The Commission was plainly justified on the basis of the foregoing evidence in finding that the ability to network RCA color over 2.7 megacycle cable had not yet been sufficiently proven. Appellants point to no evidence which weakens the finding; they only assert that they disagree with it and that, on the basis of a selection of some of the evidence just summarized, the Commission should have come to a different conclusion. Obviously this does not establish that the finding is in error.

RCA susceptibility to interference. The Commission found (First Report, Par. 101, R. 145) that the RCA system has greater susceptibility to oscillator radiation than does black and white television or the CBS color system. The testimony establishes this fact⁷⁹ without contradiction, and RCA's own witnesses conceded it (Tr. 6073, 7593, 8514, 10685; RCA Ex. 425, Tr. 10761). It also establishes that the RCA system is about twice as susceptible to such interference as is the standard black and white system, and that the effect may be not only to produce an annoying pattern on the picture but to destroy the color altogether (Tr. 8458, 11654-6).

⁷⁹ Tr. 8222, 8263 (D. B. Smith); Tr. 8458-9, 8466-8, 11651-6 (Chapin); FCC Ex. 389, Tr. 8491; FCC Ex. 465, Tr. 11653.

Appellants do not, in effect, attack the validity of the Commission's findings on this issue; rather, they seek to minimize the importance of the problem (Br., pp. 80-81; see also p. 103). But the gravity of such susceptibility is, again, a matter peculiarly within the Commission's province. From the language of Section 301 of the Communications Act, particularly Section 301(d), it is clear that the jurisdiction conferred by the Act extends beyond concern with "interference by broadcasters with each other." Appellants' suggestion that this was the problem with which the Commission is here concerned (Br., p. 80; see also p. 103) is entirely unwarranted. The Commission was here concerned not with the cause of interference but with RCA's greater susceptibility to such interference caused by other television receivers (including, of course, ordinary black and white receivers). The Commission's conclusion that the interference susceptibility is not lightly to be dismissed is firmly based on the testimony in the record of the Commission's own engineer, who had conducted laboratory tests, and who testified to its significance and the likelihood of its accentuation in the future (Tr. 8458-9, 10661; see also *infra*, pp. 106-107).

In the circumstances, appellants raise no issue of the substantial support for this finding or of the reasonableness of the Commission's conclusion that this was a deficiency in the RCA system (Second Report, Par. 3, R. 414).

Field testing of the RCA system. Appellants attack (Br., p. 83) the Commission's conclusion (First Report, Par. 138, R. 161) that "the RCA system has not met the requirements of successful field testing." The Commission emphasized the new techniques employed by the RCA system⁸⁰ and the complexity of its equipment; it reaffirmed its earlier statement of policy that (First Report, Par. 138, R. 162):

⁸⁰ RCA's chief witness himself underscored the "new" and "unique" nature of the RCA system (Tr. 2660).

Before approving a new system of television it is indispensable that there be an adequate program of field testing. Receivers and transmitters must be subject to numerous tests over a long period of time and at a diversified set of locations and operating conditions so that operation under average home conditions is closely approximated. Without such field testing, there is no assurance that all fundamental defects have been eliminated. There is a great difference between the performance of a system in a laboratory with trained personnel and its operation in the home by the average citizen. In the history of electronics there have been developments which looked promising in theory and even in operation in the laboratory but which revealed such fundamental defects when subjected to adequate field testing that they had to be abandoned entirely.

Appellants' attack on the Commission's conclusion that the RCA system has not been sufficiently field tested comprises nothing more than reference to testimony of RCA witnesses and to RCA exhibits in which various activities, often in conclusory terms, are described.⁸¹ Even were this evidence accepted at its face value, the determination whether such activities constitute sufficient field testing is within the special province of the Commission. And in any event, RCA's own evidence, to which it refers, readily establishes how far its "tests" fall short of meeting the elements of field testing, quoted above. There is nothing to establish definitively that average home conditions for color reception were approximated, or that all of RCA's activities were not supervised by its expert engineers, or that a wide variety of transmitter and receiver locations,

⁸¹ Thus, for example, RCA Ex. 377 (Tr. 7829) purports to be a "summary of field test activities", but it is nothing more than a table of contents embodying references to various RCA exhibits and to the testimony of RCA witnesses discussing a number of field test items. But the testimony thus referred to, in turn shows that in many instances no field tests were conducted and the conclusions were reached either on the basis of laboratory analyses by RCA engineers or upon theoretical consideration (Tr. 6037-6124).

operated under normal day-to-day circumstances, were involved. Rather, the indications are quite to the contrary.⁸²

Further, it may be noted that if explicit testimonial support be needed for a conclusion of this nature, it is abundantly present in the record. Almost without exception, the witnesses characterized by appellants as "responsible" industry experts testified that the RCA system was not yet ready for standardization and that further tests were necessary (Tr. 7962-3, 8093 (Fink); Tr. 8203, 8245-6, 8249 (D. B. Smith); Tr. 5289 (T. T. Goldsmith); Tr. 9687 (Baker); see also Tr. 7411, 7451 (Jensen); Tr. 11330 (Matthews)).

Clearly, appellants' contentions on this score do not, in the light of the foregoing, raise any serious doubts concerning the obvious validity of the Commission's conclusion that the RCA system has not been sufficiently field tested.

(b) *Findings concerning CBS.*

Appellants' attacks on particular findings and conclusions of fact concerning the CBS system have been so argumentatively diffuse that it is exceedingly doubtful whether they involve the question of substantial supporting evidence at all. Nevertheless, we shall examine briefly herein the evidentiary support in the record for the Commission's findings of fact concerning the CBS system.

⁸² So far as the record shows, only one transmitter in one city was used for the "field tests" which in any event, involved home reception of color in black and white rather than home reception of color in color. These are the "tests" to which appellants so expansively refer (Br., p. 83). None of these alleged "thousands of persons" saw RCA color pictures and but 50 comments were received concerning the black and white pictures viewed by the public, although the potential audience in the city comprised 100,000 families (Ex. 367, p. 7; Tr. 7496).

Implicit both in RCA's Progress Report of July 31, 1950 (see *infra*, pp. 125-130) on which appellants rely so heavily, and in RCA's petition for delay of October 4, 1950, is the concession by RCA that further field test of many elements of the RCA system is necessary.

CBS picture quality and system equipment. It is abundantly clear that the Commission's findings concerning the satisfactory nature of the CBS color picture and the simplicity of its equipment have the requisite evidentiary support in the record.

Thus, for example, in respect of the quality of the CBS color picture, Dr. Judd, in charge of research in colorimetry at the National Bureau of Standards, Department of Commerce (Tr. 3746), testified that "the color rendition by the CBS system has been uniformly good" (Tr. 9313), that the excellence of the quality "consisted in clear pictures, adequate brightness, and freedom of misregistration" (Tr. 9315), and that "I would like very much to get a set which had color fidelity equal to the CBS system and so far I have not been at all tempted to buy a television receiver" (Tr. 3757-8). George Sleeper, vice-president and chief engineer of CTI (Tr. 4121), the proponent of a rival system which Sleeper had developed, testified that CBS "had a very excellent picture" (Tr. 4420). W. R. G. Baker, a witness for the Radio Manufacturers Association, who opposed the adoption of CBS standards, testified that the CBS picture was "a superb picture" (Tr. 9850). Dr. Charles W. Geer, a professor of physics unconnected with the broadcasting or manufacturing industry, and appearing for himself (Tr. 3831), testified that he was "very well pleased with the demonstration of the CBS system", that he was "pleased enough with the Columbia system right now", and that "we have no right to ask that color television be improved a great deal more than was shown at the Columbia demonstration" (Tr. 3923). And these views were confirmed by thousands of members of the public to whom CBS pictures were demonstrated and whose reactions were recorded and tabulated: they overwhelmingly approved of the over-all quality, as well as the component characteristics, of the CBS picture.⁸³

⁸³ The results of these surveys are embodied in Ex. 332 (Tr. 6393) and Exs. 348 and 349 (Tr. 6741).

The foregoing evidence, deriving from observers who were entirely unconnected with CBS,—as well as other extensive evidence cited above in the Statement⁸⁴—plainly support the Commission's findings and conclusions concerning the satisfactory nature of the CBS picture quality. And, it may further be noted, this was a matter peculiarly determinable as a matter of observation, and was in fact observed by the Commission on the record. Its findings on this score are, hence, especially entitled to weight.

The evidence similarly provides a firm basis for the Commission's findings concerning the simplicity of the CBS equipment. The precise description of the nature and components of both the transmitting and receiving equipment are in the record.⁸⁵ There is explicit testimony concerning the simplicity and reliability of the equipment⁸⁶ (Tr. 3219-3220, 3488, 3517-8, 3528, 3813, 6561-2, 8460, 9296, 11199, 11230-1, Ex. 319, (Tr. 6261), Ex. 337 (Tr. 6575)). The costs, reviewed by the Commission in its findings, are also set out in the record in detail.⁸⁷ Further, as it noted

⁸⁴ See findings concerning CBS flicker, *supra*, p. 16, brightness-contrast, *supra*, p. 17, registration, color breakup and fringing, *supra*, pp. 17-18, color fidelity, *supra*, p. 18, and picture texture, *supra*, p. 19.

⁸⁵ The transmitting equipment is described at Tr. 3085, 3090, 3094, 6563, and in Ex. 210, Items 12 and 13 (Tr. 3460), Ex. 339 (Tr. 6575), Ex. 340 (Tr. 6575), Ex. 407 (Tr. 10813). The receiving equipment is described most fully in a set of 46 mechanical drawings, Ex. 269 (Tr. 4719); see also Tr. 3217-9, Ex. 210, Items 10 and 14 (Tr. 3460).

⁸⁶ Thus the evidence shows that the CBS receiver requires a total of only three more vacuum tubes than a standard black and white receiver (Tr. 11230-1); it also shows that no controls for the color receiver in addition to those for a black and white receiver are needed (Tr. 3219-3220); and the additional all-electronic circuits required for the color components of a set require only two tubes, using a current drain of only 8/1000ths of an ampere (Tr. 3220).

⁸⁷ For evidence concerning the costs of transmitting equipment, see Ex. 210, Item 7 (Tr. 3460), Ex. 396 (Tr. 8875), Tr. 3212-3, 10822-3. For evidence concerning the costs of color receivers, see Tr. 3243, 3513, 3517, 3521, 3527-8, 3592, 3594, 3666-7, 3689, 4975-6, 9000, 9089, 9099, 9136, 9137, 10048-9, 10091, 11230-2.

in its First Report (Pars. 54, 113, 140, R. 128, 152, 163), the Commission had an opportunity to observe the equipment, and its performance, in a number of demonstrations involving a wide variety of subject matter originating both in the studio and out of doors.

The foregoing readily establishes; accordingly, that the Commission's findings of fact concerning the satisfactory nature of the CBS picture quality and the simplicity of the CBS equipment are more than adequately supported by the evidence in the record.

Indeed, appellants do not really quarrel with these findings. They insist only that "mechanical disc" receiving equipment is unsatisfactory in this "atomic age" (Br., p. 65). That contention hardly constitutes an attack on the sufficiency of the Commission's detailed findings that the quality of the CBS picture is satisfactory and the CBS equipment is simple. Rather, appellants' argument at most raises the issue of whether the Commission was reasonable in approving a system which currently uses disc-type receivers but which can, as the Commission found (First Report, Par. 144, R. 164), dispense with the disc and use a tri-color tube of the type demonstrated by RCA—if such a tube should be successfully developed (see *supra*, note 76, p. 64). Clearly, the action of the Commission in not ruling out the CBS system on the ground that at the present time it uses a disc in its receivers (as well as projection receivers without a disc) is not unreasonable.

CBS "susceptibility to flicker." There is ample support for the Commission's findings that the brightnesses achieved by the CBS disc receivers are adequate for normal home viewing and that at these brightnesses, flicker is not objectionable (*supra*, p. 16). The evidence shows without dispute that the CBS disc receiver achieved a brightness of between 20 to 30 foot lamberts (Tr. 3319, Ex. 276, Item D2, pp. 11 and 29 (Tr. 5737)). Further, the evidence establishes that at the minimum desirable view-

ing distance,⁸⁸ no flicker at all is apparent at 18½ foot lamberts brightness, while flicker does not reach the point of being objectionable until a brightness three times as high is reached (52½ foot lamberts) (Tr. 3170-1, 3177-8, 5159, 5282, 5351, 8112, 8957, 8964, 9249). There is also clear and direct evidence that the brightness achieved by CBS disc receivers at which flicker is not apparent is wholly satisfactory. An exhibit prepared by the Research Division of the Allen B. DuMont Laboratories, Inc., and submitted in evidence by that company, concluded, that "Direct-view color receivers of the mechanical type have acceptable brightness . . ." (Ex. 276, Item D2, Conclusion No. 3 (Tr. 5737)). Dr. Judd attributed the uniform quality of CBS pictures to "adequate brightness" among other factors⁸⁹ (Tr. 9315). The public reaction surveys submitted by CBS also showed a virtual unanimity among the thousands of

⁸⁸ Appellants are mistaken in stating (Br., p. 61) that the maximum brightness that can be enjoyed at "the most favorable" viewing distance is 18½ foot lamberts. Rather, as stated in the text, the distance at which flicker first becomes just perceptible in a picture of the brightness of 18½ foot lamberts is the *minimum* viewing distance—i.e., the minimum distance at which the lines in a television picture are no longer visible. For CBS pictures, that minimum distance is established to be a little more than five times the picture height (Ex. 344, pp. 2-3, Fig. 2; Tr. 3584-5, 3986-7, 6591-2). RCA's own witness, however, testified that the *minimum* viewing distance is seven or eight times the picture height (Tr. 7752). Since flicker becomes less apparent the further the distance between the television receiver and the viewer, flicker in the CBS picture would not even be apparent at the minimum viewing distance thus specified by RCA until the brightness reached 24 foot lamberts and would not be objectionable until a brightness of 72 foot lamberts was reached (Tr. 3170-1, 3177, 8956-7, 8962-4, 9250). And the evidence establishes further that the *normal* viewing distance—that is, the distance from the receiver at which viewers actually sit—is between 12 and 15 times the picture height (Ex. 346; Tr. 6675-8). Thus at normal distances, the brightness of the CBS picture can be considerably higher than 24 foot lamberts before flicker becomes apparent.

⁸⁹ A survey conducted by an independent consulting engineer (Tr. 8090, 9915-6) showed that the brightness of new standard black and white receivers on the market averaged only 17 foot lamberts (Ex. 397 (Tr. 8877); see also Tr. 8874-6).

observers surveyed that the CBS receivers were adequately bright, or, indeed, a little too bright, while virtually none noted any flicker (Ex. 332, pp. 2, 16, Tr. 6393; Ex. 348, p. 11, Tables 3a, 3b and 6a, Tr. 6741; Ex. 349, p. 6, Tables 3 and 6b, Tr. 6741). And Donald Fink testified (Tr. 2167-8) that he had noticed flicker on CBS receivers only when he was next to them, that at normal viewing distances, he saw no flicker, and that the flicker he had seen would not have been noticed by the public.

It is clear, accordingly, that there is ample support for the Commission's findings that at levels of brightness which are wholly satisfactory, there is no objectionable flicker in CBS disc receivers.

Appellants' citations (Br., pp. 61-64) do not undermine the substantiality of this supporting evidence on this issue. At most, the citations establish some conflict in the evidence. But in any event, the evidence cited by appellants, even standing alone, is not persuasive. Thus appellants refer to a statement by Dr. DuMont (Tr. 9499) that "... you cannot get a bright enough picture without flicker in the CBS system ...". As shown above, there not only was ample contrary testimony which the Commission clearly was entitled to accept, but Dr. DuMont's conclusion is squarely at odds with the report of his own Research Division (see *supra*, p. 75). The reference by appellants to the comments of Motorola (Br., p. 63) deals only very indirectly and incidentally with flicker; in any event, the reference is to an exhibit (Ex. 384 (Tr. 8464)) submitted by the Radio Manufacturers Association; the statement in the exhibit to which appellants refer is by a manufacturer who was not a party to the hearings, did not appear as a witness, and was not subject to cross-examination. Not only was the statement pure hearsay, but the exhibit was not described, discussed, or vouched for by any witness (Tr. 8464), and was offered and admitted only for an exceedingly limited purpose (Tr. 8463-4). Appellants have now sought to use it for a different purpose. Clearly, 'evi-

dence" of such a nature does not even rise to the status of substantiality, let alone to the dignity of such evidence as would undermine the evidence, cited above, which supports the Commission's findings.

Further, appellants (Br., pp. 63-64) refer to a report submitted in an earlier hearing, the transcript of which was incorporated by reference in the instant hearing, purportedly indicating a maximum brightness "useful" for television of 1400 foot lamberts and a minimum brightness of 30 foot lamberts. This report, it may be noted, was never referred to or discussed in the course of the instant hearings before the Commission. It is, in addition, irrelevant to the question of the adequacy of brightness of CBS disc receivers since, as the Commission found, a major purpose of brightness is to permit maintenance of proper contrast in the picture. Because the disc serves to filter out light, a proper contrast can be maintained in disc type receivers at far lower levels of brightness than in ordinary black and white receivers (First Report, Par. 74, R. 136)—with which the report cited by appellants was concerned. Moreover, the report is on its face so highly conditional and qualified⁹⁰ that it clearly does not constitute evidence tending to destroy the explicit evidence cited above to support the Commission's findings, which establishes both that the brightness even of black and white receivers is far lower even than the minimum indicated by the report (*supra*, note 89, p. 75) and that the brightness of CBS pictures is in any event wholly satisfactory.

⁹⁰ Thus, for example, the report states that its conclusions are "tentative" (p. 127); that "full knowledge in this field requires a program of work far beyond the [committee's] capacity" (p. 127); that "the validity of these results, for television pictures, should be regarded as not fully established" (p. 129); that "the trends may be indicated by these tests, though there is insufficient data to draw firm conclusions" (p. 140); and that "it is to be understood that these findings cannot pretend to be a scientific consideration of the subject, but merely the record of a very small number of tests witnessed by the [committee]" (p. 143).

Further, appellants cite (Br., p. 62) a statement by Dr. DeForest that the CBS system a "color subtractive" system and hence there is "an enormous loss of light." Dr. DeForest's statement, however, is robbed of its significance not only because of his obviously incorrect characterization of the CBS system as "color subtractive" (Tr. 5988-9, 5906-7) but because in fact he had never witnessed a demonstration of the CBS system (Tr. 5899-5901).

Appellants' only other reference (Br., p. 62) to testimony (other than that which merely relates to the general policy consideration of whether the Commission should have insisted on higher brightness)⁹¹ concerning brightness is to a statement by T. T. Goldsmith of DuMont that at a distance of 15 feet "there is very perceptible flicker" on a CBS receiver the brightness of which was 18 foot lamberts and to a statement, in response, by Murphy of CBS that "Well, there should be" (Tr. 3327). But the record establishes that the flicker referred to in this colloquy did not involve the system flicker which results from brightness. That, in fact, the "flicker" referred to by Goldsmith could not have been that type of flicker, but rather must have been a wholly extraneous phenomenon resulting from a temporary defect in equipment unrelated to the system (cf. Tr. 3282-5), is in any event apparent from the fact that, as the record establishes without contradiction (Tr. 3177-9, 8956, 8962-4, 9250, 11226), system flicker on CBS disc receivers is not even perceptible at a brightness of less than 24 footlamberts for a viewing distance of seven times the picture height. Hence since, as appellants note, Goldsmith was sitting at a distance of 15 feet (far greater than seven times the picture height) and the receiver brightness was 18 foot lamberts, the "flicker" which Goldsmith claimed to have observed, and which many others present did not observe (Tr. 3328), could not have been the type of flicker here in issue.

Appellants' citations thus supply little comfort to their contention. Plainly, the evidence which in fact supports

⁹¹ This policy issue is discussed below at p. 88.

the Commission's findings, discussed above (pp. 74-76) is not affected, let alone destroyed, by the evidence advanced by appellants.

CBS geometric resolution. Concerning the Commission's findings and conclusions relating to CBS "geometric resolution" (First Report, Pars. 90, 143, R. 142, 163), appellants argue (Br., pp. 67-69) that the reduction in such resolution which the Commission in fact did find to exist is a defect to which the Commission should have given greater emphasis. This contention, of course, raises no issue of substantial evidence whatever.⁹² Indeed, the primary facts found by the Commission concerning the precise resolution of the CBS system (R. 142) are undisputed in the record (5719; Ex. 204, Table 1 (Tr. 2589), Ex. 302 (Tr. 6183)). The results of the reduction in resolution in its effects on the CBS picture, and the importance to be attached to the reduction, are matters within the particular province of the Commission.

But if supporting evidence be needed, it is clear that there is such evidence for the Commission's conclusion that in the CBS pictures the addition of color "more than outweighs the loss in geometric resolution so far as apparent definition is concerned" (First Report, Par. 143, R. 163).

Thus, the evidence is clear that, as the Commission found (First Report, Par. 88, R. 142), there are, in addition to resolution, other and important factors such as contrast and sharpness, which enter into the "apparent definition" (i.e., clarity and ability to portray detail) of a picture⁹³ (Tr.

⁹² To the extent that appellants' contention raises an issue concerning the reasonableness of the Commission's failure to include a requirement of higher resolution as a criterion for adoption of a color system, see *infra*, p. 86.

⁹³ This is supported by witnesses for CTI, RCA and CBS. George Sleeper of CTI testified (Tr. 4285) that "four factors are involved in the overall definition of a picture: These are: the geometric resolution, the contrast ratio, the rate of change from one contrast level to another, and color." Dr. Engstrom of RCA agreed (Tr. 10908; see also Tr. 10912) that there was a dis-

3184-8, 4011, 6603, 6627, 6636-7, 8893-5; see also Tr. 4285, 10908, 10912). The record also establishes that color adds considerably to apparent definition. Mr. McIntosh, an independent consulting engineer who testified on behalf of CTI and who opposed the adoption of CBS standards on the ground, *inter alia*, of its reduced geometric resolution (Tr. 4743-6), nevertheless stated (Tr. 4743): "It is well known that the addition of color to a picture at least seems to the human eye to increase its effective definition. As a

distinction between "absolute detail" (geometric resolution) and "other qualities in the picture that go to make up the intelligence that the public can enjoy"; he identified these "other qualities" as "matters of contrast, tone range and other things." Dr. Goldmark of CBS testified (Tr. 4011) that geometric resolution is "one of maybe 20 items which will determine whether that color television picture is adequate or not". In a more detailed analysis, Goldmark testified (Tr. 3184-5):

The over-all definition of a television picture is an integration of the information conveyed to the eye by the following factors:

The first factor is the number of picture elements within the area of the picture. This I will refer to as 'geometrical resolution,' and it is upon this single factor of definition which the witnesses of the other parties who have testified have focused their criticism.

The second factor of over-all definition is the visual contrast among the various objects in the picture. In black and white pictures this contrast is created by variations in lightness and darkness over the picture area. This I will refer to as plain 'contrast.'

In color pictures this contrast is created by the same variation in lightness and darkness, and in addition by a third factor—variation in color hue and saturation of the objects viewed. This I will refer to as 'color contrast.'

The fourth factor of over-all definition is the rate of transition from one contrast level to another, or from one color hue or saturation to another. This I will refer to as 'crispness.'

The effect of the combination of geometrical resolution, contrast, color contrast, and crispness in producing over-all definition cannot be measured on paper with available yardsticks and can only be evaluated by actual viewing of pictures.

result, a colored picture should, in general, have greater apparent definition than a black and white picture containing the same number of picture elements." ⁹⁴

Such testimony, particularly when supplemented by the Commission's first hand observation of the pictures at on-the-record demonstrations, ⁹⁵ obviously provides a firm foundation for its conclusion that in the CBS pictures, the reduction of geometric resolution is not significant in the overall quality of the pictures and that the presence of color "more than outweighs" the reduction by providing added apparent definition. But further, there is explicit support in the record for the conclusion itself, the pub-

⁹⁴ A simple explanation of the significance of "apparent" definition appears in the testimony of George E. Sleeper, Jr., a CTI witness (Tr. 4287):

Q. Does the presence of color in a picture increase its definition?

A. Yes. The exact amount of increase depends upon the color contrast in the picture, but for all ordinary subject matter color will considerably increase the definition.

The Chairman: What do you mean by definition? The number of lines? or does it appear to increase the definition? Which do you mean?

Witness: It appears to increase the definition because there is more color information in a color picture, there is more information transmitted from the camera to the receiver than there is in a black and white picture.

The Chairman: Is there actually greater definition in a color picture than in black and white?

Witness: Not in the terms of elemental detail theoretically. Actually, there is.

The Chairman: As a matter of fact, is there not less definition in a color picture than in black and white?

Witness: No, that is not true. [Tr. 4287]

⁹⁵ It is significant that despite the fact that measurements at the demonstrations showed somewhat higher geometric resolution in RCA pictures than in CBS pictures (Ex. 302, Tr. 6183), Dr. Goldmark of CBS (Tr. 6605, 6610), Mr. Chapin of the FCC (Tr. 10640, Ex. 388, p. 4, Tr. 8491) and Dr. DuMont (Tr. 9386, 9458), one of the witnesses identified by appellants as a responsible industry expert, each testified that the overall appearance of clarity and definition in CBS pictures was superior to that of the RCA pictures.

lic reaction surveys in evidence show that an overwhelming majority of those who had witnessed demonstrations of the CBS color pictures were of the opinion that their "clearness of detail" was either "excellent" or "very good"⁹⁶ (Ex. 348, p. 3, Tables 4a and 4b, Tr. 6741; Ex. 349, Table 4, Tr. 6741; see also Ex. 332, p. 22, Tr. 6393).

In the light of the foregoing it is plain that if appellants do in fact contend that the Commission's findings concerning CBS geometric resolution and overall definition are unsupported by substantial evidence, the contention is wholly mistaken.

CBS picture-size limitation. Appellants attack the Commission's findings and conclusions (*supra*, pp. 20, 22-23, 29) concerning CBS picture-size limitations (Br., pp. 58-60). The attack, however, centers on the argument that the findings were based on "speculation and hope", the error of which has already been established (*supra*, pp. 46-47). The only findings or conclusions, insofar as here relevant, on the issue of picture-size limitations, were that (1) the present CBS direct-view receiving apparatus *was* limited to 12½ inches—a finding which appellants obviously do not dispute, but embrace (First Report, Par. 111, R. 150); and (2) the limitation was not fatal since the CBS color pic-

⁹⁶ There is similarly firm support in the record for the Commission's conclusion (First Report, Par. 143, R. 164) that, despite the reduction in geometric resolution, the black and white picture received from CBS color transmissions "is still an acceptable picture." The same public reaction surveys show that of the persons viewing the demonstration of black and white from CBS color transmissions, 21.8 per cent rated the overall quality of such pictures "much better" than standard black and white pictures; 31.2 per cent rated it "somewhat better"; 40 per cent rated the quality about the same; and only 3.7 per cent felt the quality was poorer than that of standard black and white pictures (Ex. 348, p. 3, Table 11, Tr. 6741). Further, over 80 per cent rated the "clearness of detail" of the black and white pictures from CBS color transmissions as "excellent" (34.1 per cent) or "very good" (46.3 per cent); 15.7 per cent rated it "good"; 2.5 per cent rated it "fair"; and only 0.2 per cent rated it "poor" (Ex. 348, pp. 5 and 7, Table 10, Tr. 6741).

tures on a 12½ inch direct view receiver and on an unlimited size projection size receiver are satisfactory and "the attractiveness of color pictures may be sufficiently great to cause people to prefer a direct view receiver with a 12½ inch tube or a large size projection receiver if they can get color as against a 16 inch, 19 inch or larger direct-view receiver that is limited to black and white pictures" (Second Report, Par. 12, R. 418). This latter conclusion is obviously one involving the judgment of the Commission within its special province, and can hardly be shown to be unreasonable (see *infra*, pp. 87-88). In any event, there is explicit evidence in the record (*supra*, note 37, p. 29) that the public may well prefer 12½ inch color pictures to larger size black and white pictures. The findings and conclusions on this issue are, accordingly, clearly invulnerable.

3. *Summary and conclusions.*—As has been seen, appellants' attack on particular findings shows that in considerable part they turn on the contention, already shown to be mistaken (*supra*, pp. 45-46, 48-49), that those findings are not properly supported because they were based on early testimony which had been superseded by later developments or on testimony of FCC, CBS and CTI witnesses.⁹⁷ In part, appellants' attack on particular findings and conclusions, especially those relating to the CBS system, is not actually directed at the question of supporting evidence but embodies a miscellany of argumentative material⁹⁸ which, if sound, might tend to show that the Commission's ultimate judgments were wrong, but do not in any way raise a question concerning the presence of evidence to support the findings.⁹⁹ At most, appellants show only that the record

⁹⁷ E.g., appellants' contentions relating to the Commission's findings concerning RCA color fidelity and picture texture (Br., pp. 69-75).

⁹⁸ E.g., appellants' contentions relating to the Commission's findings concerning CBS picture size limitations, flicker characteristics and resolution (Br., pp. 58-64, 67-69).

⁹⁹ To the extent that these arguments raise questions of the reasonableness of the Commission's action, see *infra*, pp. 85-96.

included some fragments of testimony which, had the Commission also rejected other testimony which in fact supported its findings, would have permitted findings by the Commission different from those which it actually made.¹⁰⁰

In respect of none of the particular findings and conclusions do appellants even attempt an analysis of the overwhelming supporting evidence which has been cited herein. Appellants do not establish, and indeed, do not even seek to establish, that the sparse and unpersuasive evidence they cite so destroys the evidence cited herein that the latter is drained of its otherwise clear substantiality.

It is submitted that in these circumstances, and particularly since the Order here involved is a rule-making proceeding,¹⁰¹ appellants raise no serious question concerning the validity of the Commission's findings of fact. They must do more than show a mere conflict in testimony. They must do more than show that it may have been possible, or even reasonable, for the Commission to have reached different results. Where, as here, there is such an overwhelming store of evidence which so explicitly tends to support the Commission's findings, those who attack such findings must make a showing that, nevertheless, such evidence has been so negated by other evidence in the record that the Commission was compelled to reject the former in favor of the latter. Cf. *Swayne & Hoyt, Ltd. v. United States*, 300 U. S. 297, 303-304.¹⁰²

¹⁰⁰ E.g., appellants' contentions relating to the Commission's findings concerning the adequacy of CBS brightness and to RCA's equipment considerations (Br., pp. 61-64, 75-80).

¹⁰¹ See *National Broadcasting Co. v. United States*, 319 U. S. 190; *Federal Security Administrator v. Quaker Oats Co.*, 318 U. S. 218, 228; *Opp Cotton Mills v. Administrator*, 312 U. S. 126, 156.

¹⁰² The *Universal Camera* case, No. 40, this Term *supra*, does not, of course, alter this well-established rule. On the contrary, in that case, this Court explicitly reaffirmed that even where the scope of review is "substantial evidence on the record considered as a whole", such scope is not

intended to negative the function of the Labor Board as one of those agencies presumably equipped or informed by ex-

Plainly, appellants' own brief shows on its face that they have not met this burden nor, since they have altogether ignored the supporting evidence, have they even undertaken to meet this burden. Hence there is not, in fact, a genuine substantial evidence issue before this Court. Clearly, therefore, their contentions on this score must be rejected.

B. The Commission's Choice of Criteria for Adoption of a Color System Was Reasonable.

In its First Report (Par. 122, R. 155), the Commission set out a series of minimum criteria which a color system must meet "to be considered eligible for adoption."¹⁰³ Appellants contend (Br., pp. 84-97) that the Commission erred in omitting a number of other criteria which, appellants urge, are "more important" than those included by the Commission. While appellants treat this issue as a question of substantial evidence, contending that "There is no support in the record" for these alleged omissions, it is obvious that the only issue thus raised is the reasonableness of the Commission's choice of criteria and of the weight which it gave to various factors in selecting a color system. Plainly, the Commission's action in the premises was wholly reasonable.

(a). *Resolution; picture size; flicker-brightness.* Appellants complain (Br., pp. 89-95) that the Commission improperly omitted any requirements "that the resolution afforded by a color system be of high quality" and that the Commission did not sufficiently emphasize the importance of

perience to deal with a specialized field of knowledge, whose findings within that field carry the authority of an expertness which courts do not possess and therefore must respect. Nor does it mean that even as to matters not requiring expertise a court may displace the Board's choice between two fairly conflicting views, even though the court would justifiably have made a different choice had the matter been before it *de novo*.

¹⁰³ These criteria appear herein *supra*, note 18, p. 14.

larger picture size and the "flicker-brightness relationship." The Commission's careful discussion of these issues and the evidence supporting its findings relative to them¹⁰⁴ clearly establish that its treatment of these factors was a proper and reasonable exercise of its discretion.

In respect of its treatment of resolution, it is to be noted that the Commission included among its criteria (First Report, Par. 122, R. 155) the requirement that a color system "... be capable of producing a color picture which ... has adequate apparent definition ...". Since the record shows that, as the Commission found, resolution is only one of the factors contributing to the definition of a picture (*supra*, pp. 79-81), and since it also shows that the definition of the CBS picture was entirely adequate (*supra*, pp. 81-82), it was hardly capricious of the Commission not to insist on some indefinite standard of high geometric resolution, the added contribution of which to an already satisfactory picture would clearly be academic.¹⁰⁵ In any event, the evidence in the record squarely supports the Commission's emphasis on over-all definition rather than on mere geometric resolution, which is one of its components.¹⁰⁶

¹⁰⁴ The Commission's findings and conclusions concerning resolution appear in its First Report, Par. 88, 90 and 143 (R. 142, 163) (see *supra*, pp. 18-19, 22); paragraph 144 of the First Report (R. 164) (see *supra*, pp. 20, 22-23) and paragraph 12 of the Second Report (R. 418) deal with picture size; and paragraphs 55, 58-60, 65-66, 72, 74-75 and 142 (R. 129, 130, 132-3, 135, 136, 163) of the First Report deal with flicker and brightness (see *supra*, pp. 16-17, 22). The relevant evidence supporting these findings is summarized at pp. 74-83, *supra*.

¹⁰⁵ Appellants' reference (Br., pp. 90-91) to a speech by the Chairman of the Commission in which he is asserted to have "acknowledged the detrimental effect of a lowering of standards" illustrates the extraordinary dangers of citing materials which are not only outside the record but are torn out of context. The speech referred to did not deal with resolution or with engineering standards at all. It dealt only with the Chairman's concern about the standards of *programs*—their quality and their conformity with good taste.

¹⁰⁶ For references to the testimony establishing that geometric resolution is only one of a variety of factors contributing to the

Similarly, it is plain that the Commission was neither arbitrary nor capricious in its refusal to insist, as a condition to adopting a color system, that its present receiver apparatus must be able to produce direct view pictures in excess of 12½ inches. Obviously, this is a matter within the particular province of the Commission. And the record amply supports its action in the premises—if such support be needed. For as already noted (*supra*, note 37, p. 29) a public reaction survey showed an overwhelming preference for 12½ inch color pictures to 16 inch black and white pictures. In another survey, less than one per cent of the thousands of persons who viewed the CBS color picture on 10 inch and 12½ inch receivers noted “miscellaneous receiver defects” which included, among other things, “screen too small” (Ex. 348, Table 6c; Ex. 349, Table 6c). And finally, Dr. Engstrom, RCA’s own witness, was asked whether he thought “that it is reasonable to assume that the public, to get color started, might want to choose a different sized picture in color in competition with a large black and white picture” (Tr. 10891-2). He replied (Tr. 10892): “I am not sure that is basic except that I am sure that their appetite has been whetted by the larger black

definition of a picture, see *supra*, p. 79. The record also explicitly establishes that the public and set manufacturers themselves are not greatly concerned with, and do not take advantage of, high geometric resolution (Tr. 2392, 2403-10, 3187, 5480, 6599, 7988, 8100, 10646-7, 10672-3.) The record shows, too, that there are markedly diminishing returns in respect of geometric resolution, and that the differences between a 405 line picture produced under the CBS system and a 525 line picture are not readily discernible on subject matter (Tr. 3186-8, 3197-8, 3269-73, 3312-5, 6626, 7882, 8893, 9575-8, 10897-8, 11219-23; Ex. 214). For example, Donald Fink testified (Tr. 8006-7): “. . . I think it has been reasonably well assumed you can change the number of lines by a factor of about 50 per cent for a given band width without any substantial change in the subjective sharpness of the picture. That was established many years ago by Baldwin, and I think it is generally considered to be the true fact by everybody.”

and white picture, and they would also like larger pictures in color, relatively."¹⁰⁷

Nor does appellants' contention (Br., p. 95) that the Commission's criteria "fail to give proper recognition to the importance of the flicker-brightness relationship" raise any serious question. The third criterion specified by the Commission for a color system (First Report, Par. 122, R. 155), is that:

The color picture must be sufficiently bright so as to permit an adequate contrast range and so as to be capable of being viewed under normal home conditions without objectionable flicker.

As already noted (*supra*, pp. 16-17, 22, 74-79), the Commission explicitly found that the CBS picture met this criterion, and its findings are amply supported. In these circumstances, it can hardly be said to be unreasonable for the Commission not to have insisted, as a condition precedent to the adoption of a color system, that a system meet some academic criterion of brightness which is greater than is needed. For, plainly, it is enough if the system be capable of sufficient brightness, without flicker, for normal home use.

(b) "*Effectiveness of channel utilization.*" Appellants contend (Br., p. 96) that the Commission fatally erred in not including among its criteria the factor of "effectiveness of channel utilization". But the argument is wholly academic. Whatever the theoretical performance of the RCA system, it is plain that it would hardly constitute an effective utilization of channels to permit devotion of scarce

¹⁰⁷ Compare also the testimony of David Sarnoff, the Chairman of the Board of RCA, who stated in 1940, when he was advocating prompt adoption of black and white standards (Tr. 10387), that "I submit that a greater public interest will be served at this time by research toward the methods that would extend television service to as many homes as possible rather than in improvements that would merely add to the size . . . of the picture now enjoyed by the few" (Tr. 10390).

spectrum space to a color system which, as the Commission found, produces an unsatisfactory color picture on a receiver which is too complex for the public to work and too costly for it to buy. The heart of the Commission's inquiry was which, if any, of the systems proposed were satisfactory. In evaluating the systems, and evaluating the evidence, the Commission was dealing with the very issue which appellants contend it omitted—viz., effective channel utilization. For, obviously, that system which best meets all the criteria also most effectively utilizes the spectrum space. Accordingly, it was scarcely necessary for the Commission to list this criterion, or otherwise deal with it, for the sum of all the parts constitute the final whole of effective channel utilization.¹⁰⁸

(c) *Compatibility.* Appellants' most vigorous attack on the reasonableness of the adoption of the field sequential system centers on the fact that that system is incompatible, an issue which appellants treat throughout their brief (e.g., pp. 2-4, 9-12, 17-18, 41-52, 84-89). They stress the advantages of a compatible system the color transmissions of which can be received on existing black and white sets as a black and white picture. They urge that the fact that field sequential system transmissions cannot be received on such sets unless the sets are first adapted should have served without more, to disqualify that system, and that the Commission's refusal to accept this view was so arbitrary, unreasonable and contrary to the public interest that the action of the Commission must be enjoined.

Appellants' contention on this score, however, altogether ignores the context of the issue. It ignores the overriding

¹⁰⁸ It is interesting to note also that David B. Smith testified (Tr. 8262-4) that because of RCA's excessive susceptibility to oscillator radiation, it might be necessary to rearrange the spacing of television stations among various communities and thus reduce the number of stations which would otherwise be possible. See also *infra*, pp. 106-107. Obviously, if the RCA system would thus require reduced overall television service, there would be a less effective channel utilization.

fact, supported so firmly by the evidence, that no successful compatible system has been developed and that there is no reasonable probability that such a system will be developed. It further ignores the fact that, while incompatible, the field sequential system is the only system which gives present and future assurance of satisfactory *color* performance. It also ignores the fact that only under the CBS field sequential system is it feasible for existing set owners to receive *color* pictures by converting their sets,¹⁰⁹ while under the RCA dot sequential system, existing set owners can not receive *color* pictures on their sets, which are incapable of being converted (see *supra*, pp. 12, 20).

In essence, therefore, appellants must contend that the basic condition of a *color* television system is that it must produce *black and white* television pictures on existing receivers without change, and that a system which lacks this feature must be rejected irrespective of its ability to furnish a satisfactory *color* service both to existing set owners who wish to convert their sets and to new purchasers who wish to buy a *color* set. Receiving *color* transmissions in black and white on existing sets, appellants contend therefore, is more important than *color* itself.

The Commission, in its Reports, carefully considered this contention, and rejected it. In explicitly excluding compatibility as a criterion for eligibility for adoption of a *color* system, the Commission noted that "if a satisfactory compatible system were available, it would certainly be

¹⁰⁹ In this connection, it is to be noted that the brief of Local 1031 (which, in any event, is entirely devoid of any transcript references and which candidly pitches its arguments on matters wholly outside the record) is mistaken in asserting that under the CBS system, no black and white sets of a picture size larger than 12½ inches can be converted. The record explicitly establishes to the contrary. It shows that black and white receivers can be converted regardless of their picture size, although the viewed *color* picture may have to be reduced to 10, 12½, or 16 inches (Tr. 3448, 9000, 9135). Such a reduction in size of the *color* picture does not affect the original size of the black and white picture (Tr. 9148).

desirable to adopt such a system" (First Report, Par. 123, R. 156). But the Commission further pointed out (*id.*):

... no satisfactory compatible system was demonstrated in these proceedings and the Commission is of the opinion, based upon a study of the history of color development over the past ten years, that from a technical point of view *compatibility, as represented by all color television systems which have been demonstrated to date, is too high a price to put on color.* In order to make these systems compatible, the alternatives have been either an unsatisfactory system from the standpoint of picture quality, or a complex system, or both. A complex color system will have such formidable obstacles in its path that there is no assurance it would be acceptable to the American public. The Commission is compelled to reach the conclusion that no satisfactory compatible system has been developed (First Report, Par. 123, R. 156) [*Italics supplied*].

Further, as the Commission noted (First Report, Par. 124, R. 156), the problem of receipt of color transmissions by black and white receivers is merely a temporary problem which will decrease progressively once color standards are adopted and receivers are built so as to be capable of receiving such new standards.¹¹⁰ Moreover, even the present owners of black and white sets could either spend the "relatively minor amount of money necessary to adapt their sets" or, if they did not choose to do so, they would continue to receive the programs which would be broadcast under present black and white standards. Hence, the Commission concluded (First Report, Par. 124, R. 157):

¹¹⁰ Thus the Commission assumed that there were 7,000,000 black and white sets then in the hands of the public. It stated that if sets were continued to be manufactured at the rate of five to six million a year, then one year after the adoption of color standards, 40 percent of the receivers should be capable of receiving field sequential color transmissions; this percentage would become larger each year (First Report, Par. 124, R. 156).

It would not be in the public interest to deprive forty million American families of color television in order to spare the owners of seven million sets the expense required for adaptation.¹¹¹

Thus, plainly, the Commission's Report shows on its face that its conclusion that compatibility should not be a *sine qua non* of adoption of a color system was not whimsical, arbitrary or capricious, but, on the contrary, was the result of careful analysis and consideration and was wholly reasonable.¹¹² For, as it noted, the choice which, in essence,

¹¹¹ It is to be noted that present black and white television is limited to that portion of the spectrum known as "very high frequencies" (VHF) and to a relatively few major metropolitan areas. Since 1948, the Commission has imposed a "freeze" on granting new television broadcast licenses in order to study further the general problem of interference and allocations of channels, and to determine whether an additional portion of the spectrum, known as the "ultra high frequencies" (UHF) should also be made available to television. Indeed, the color hearings were a phase of the hearings involving these other issues. Thus, it will be seen that the problem created by the ownership of existing black and white sets is limited both numerically and geographically. Only 63 geographic points now have television service; there are 1336 other points for which stations are contemplated but in which there are now no stations (Ex. 393, Tr. 8719).

¹¹² It is true, as appellants point out (Br., pp. 19-20; 88) that many witnesses representing manufacturers of black and white sets urged that the Commission insist on compatibility. But it is to be noted that many of these same witnesses had, in 1946-1947, also supported RCA's "simultaneous" system on the ground of its alleged compatibility (see D. B. Smith, Tr. 8401; DuMont, Tr. 9402; statement of Commission Counsel, Tr. 9966); yet that system never survived field testing (First Report, Par. 139, R. 163).

But, in any event, there is explicit evidence (if such be needed) to support the Committee's conclusion concerning compatibility. Thus, it is significant that Dr. Charles W. Geer, one of the few witnesses wholly unconnected either with the broadcasting or black and white television manufacturing industry, testified (Tr. 3933) that: "I would not put compatibility above color itself" and that if it were not possible to have color with compatibility, he would prefer to have it without compatibility rather than have no color at all. For other testimony (by CBS witnesses) urging that compatibility not be made a condition to adoption of a system, see Tr. 2992-3, 6254-5, 7181, 8643-4, 8718, 8722, 9368.

it faced was between color and compatibility. On the basis of the hearings and its ten years of experience in dealing with color, it concluded that there was, at the least, great uncertainty whether the objective of compatibility was not itself inconsistent with the objective of a satisfactory color system. As the Commission stated, the price of compatibility in each compatible system thus far considered has been either excessive complexity or unsatisfactory pictures, or both—a conclusion not only plainly supported by the findings concerning the RCA and CTI systems but also by explicit testimony concerning the compromises in other directions which compatibility compels (see Tr. 4497).¹⁴³

Since, therefore, as the Commission found, the defects in the RCA compatible system were such that no remedy in the foreseeable future was assured, since color was found to be a "fundamental" improvement, since the CBS system was the only system which was found to be satisfactory, and since in any event, the compatibility problem was found only to be an interim transitional problem which would progressively decrease with the passage of time, it is clear that the Commission's determination not to deprive the public of a satisfactory color system for an indefinitely long period in the future, and perhaps forever, solely because that system is incompatible, is plainly not unreasonable. Rather it was a determination, involving a host of factors hinging on both present performance and expert judgments concerning the future, which the Commission was particularly established by the Congress to make. Firmly founded in reason as its determination is, therefore, the determination is decisive here.

Appellants suggest further, however (Br., pp. 43-45, 100-101, 107; see also pp. 49-50), that the Commission's adop-

¹⁴³ It is to be noted that many of the defects which the Commission found to exist in the RCA system were expressly attributed by it to the use of mixed highs, to dot interlace, to extremely critical tolerances, to cross-talk and to other essential elements of the RCA system which are present because of its effort to achieve compatibility (see First Report, Par. 45-52, R. 122-7).

tion of color television standards which are incompatible with black and white television standards¹¹⁴ is a departure from principles enunciated by the Commission in the past, and that such principles having become engrafted on the Communications Act of 1934 by administrative construction, the Commission is now without power to adopt an incompatible system.¹¹⁵ Even assuming the correctness of appellants' legal theory that the principle of administrative construction is applicable in such circumstances, it is plain that appellants are wholly in error on their reading of such construction. For it is clear that the principle of a single set of standards for both color and black and white television has not only never been enunciated by the Commission but, on the contrary, has been explicitly repudiated by it whenever the issue has arisen.¹¹⁶

¹¹⁴ Appellants choose to characterize this as an adoption of "multiple standards". But, of course, "multiple standards", as used in these proceedings (see *infra*, pp. 103-113), has always been used to refer to different sets of standards for the *same* television service (i.e., two sets of standards for black and white service, or two sets of standards for color service).

¹¹⁵ Appellants also appear to advance a similar argument (Br., pp. 46-51) that adoption of the CBS system also constitutes a departure from other general principles (*viz.*,—adoption of standards should, under the standards, leave "room for improvement" and standards should not be set "prematurely") and hence is beyond the power of the Commission. The short answer is that, as appears from its findings and conclusions, adoption of CBS standards was entirely consistent with these principles—assuming that the principles have such specificity of content that they can become a part of the statute by administrative construction. For the Commission noted the possibilities of future improvement which would be usable with the CBS system (i.e., long persistence phosphors, horizontal interlace and the tri-color tube). And clearly the Commission did not violate any principle against "premature" setting of standards, since it found that the CBS system was ready to be adopted now.

¹¹⁶ Indeed, of course, the standards for the RCA color system are not the same as present black and white standards. (See appellants' brief, p. 99.) Hence if the RCA system were adopted, there would also be two sets of standards, one for RCA color and one for black and white. Further, appellants' contention that be-

Thus, appellants emphasize (Br., pp. 42-44) that in a Report issued by the Commission in 1940, the Commission pointed out that there should be a "standard gauge" for transmission standards so that "every transmitting station" will be enabled "to serve every receiver within its range." But in this Report, the Commission was dealing exclusively with the question of black and white television standards. There was no issue of color television before the Commission at that time, and hence the Commission was merely enunciating the principle, to which it always has adhered (see *infra*, pp. 105-106), that for any particular broadcast service, there should be only one set of standards.

In May 1941, the Commission for the first time had occasion to deal with the question of standards for color television, concurrently with its setting standards for black and white television. At that time, the Commission adopted transmission standards for black and white television of 525 lines, 30 frames and 60 fields. Simultaneously, the Commission proposed different standards for color television—375 lines, 60 frames, and 120 fields. (First Report, Par. 8-9, R. 102-4.) Hence from the beginning, the Commission contemplated different standards for the two services—so that all receivers would not necessarily be able to receive all signals transmitted.

Similarly, in 1947, when the Commission was next faced with the issue of color television standards, it again explicitly rejected the principle that such standards be the same as, or compatible with, the existing black and white standards. In its 1947 decision (11 F.C.C. 1523; R. 474), the Commission stated:

... compatibility is an element to be considered, but of greater importance, if a choice must be made, is the

cause of administrative construction, the Commission is without power to promulgate more than one set of standards cannot be squared with its contention (*infra*, pp. 103-113) that as a matter of law, the Commission was required to set "multiple standards" for color television.

development of the best possible system employing the narrowest possible bandwidth and which makes receivers capable of good performance at a reasonable price.

Thus, on the only two occasions when the issue was before it prior to the instant proceeding, the Commission enunciated the principle, precisely as it did in 1950, that compatibility between black and white standards and color standards was not necessary, and that different standards for each of the two services were not only permitted, but contemplated. Plainly, therefore, there is no such administrative construction as appellants contend which barred the Commission's adoption of an incompatible system.

C. The Commission's Action in Seeking a Means to Prevent the Aggravation of the Compatibility Problem in Order to Permit Further Consideration was Reasonable.

As described more fully above (pp. 23-28), the Commission could have, on the basis of its findings and conclusions, adopted standards for the field sequential system at the time of the First Report. But it decided not to do so. For the majority of the Commission concluded that it would be desirable to delay the adoption of color standards, provided that it proved possible to do so without substantial injury to the public, in order (1) to obtain further information concerning three recent developments (the tri-color tube, horizontal interlace and long persistence phosphors) which had not yet been fully tested or established, and the effect of such developments on the field sequential (CBS) system when used with it; and (2) to provide additional time for possible development and demonstration of new color systems and improvements in existing color systems which had been informally called to the Commission's attention after the record was closed. See Statement, *supra*, pp. 23-28. The Commission expressly recognized that none of these first three possible improvements were a pre-

requisite to the immediate adoption of the CBS color system and that this system was "at least as fully developed as was the black and white system" when it was adopted and standardized in 1941 (First Report, Par. 149, R. 106). It felt, however, that if some way could be devised to avoid the aggravation of the compatibility problem which, as indicated above, would otherwise result from further delay in adopting the CBS system, the writing of color television standards could profitably be deferred until further information with respect to each of these matters could be secured.¹¹⁷

The Commission stated that it thought it might be possible to achieve this objective if black and white transmission standards could be amended so as to include a "bracket" of transmission values and if the manufacturers of receiving equipment could incorporate into new sets,

¹¹⁷ As the Commission stated in its Second Report (Par. 6, R. 415):

The Commission did not in its First Report finally adopt the CBS color system. Instead, it set forth a procedure whereby, if the status quo on compatibility were maintained, a decision would be postponed so that the Commission could give further consideration to four matters—large-size direct-view tubes on the CBS system, horizontal interlace, long persistence phosphors, and the development of new compatible systems and improvements in existing compatible systems, which had been informally called to the Commission's attention since the conclusion of the hearing. It is obvious that some procedure had to be devised whereby the compatibility problem would not be aggravated if a decision were postponed. Otherwise, we would be in the position of inviting the risk that if, after postponing a decision, the compatible color systems should again fail to meet the minimum criteria for a color system, as they have failed in the past, the number of receivers in the hands of the public would have increased to such a point where, as a practical matter, it might not be practicable to adopt an incompatible color system even though we now know that such system meets all of the criteria for a color system. Hence, it is obvious that if a decision were to be postponed, a method had to be devised to maintain the status quo in compatibility so that when the time did arrive for making a decision, the Commission would be in relatively the same position as it is today—so far as compatibility is concerned—to adopt a successful incompatible system if all of the compatible systems again failed to meet the minimum criteria for a color system.

thereafter manufactured, means to receive transmissions broadcast under such "bracket standards". By these means, the purchasers of new sets would be able to receive black and white pictures from transmissions under both the existing monochrome standards and the field sequential system as well as under possible amended monochrome and field sequential standards (see *supra*, pp. 26-27). The Commission, therefore, requested comments concerning the feasibility of adopting bracket transmission standards; it simultaneously requested the television manufacturing industry to inform it whether the industry could and would build future television receivers capable of operating within brackets so as to receive, among other transmissions, field sequential color transmissions in black and white in addition to existing black and white transmissions. If this could be done without the necessity of holding hearings on the question of adopting such bracket standards, the Commission stated the compatibility problem would not become more serious during the period of postponement of a final decision, and hence more time could be taken to determine whether any additional improved techniques could be perfected. If, however, the compatibility problem could not be contained in this manner, the Commission stated that the adoption of the field sequential system could not be postponed in the hope of such improvements or the problematical perfection of a compatible system, for every day of delay would mean the production and sale to the public of the existing type of receiver incapable, without adaptation, of receiving transmissions under the CBS color system. As it noted, if, after such delay, no satisfactory compatible system were presented, the increased number of black and white sets in the hands of the public might eventually prevent the adoption of the only satisfactory color television system yet devised.

The response to the Commission's suggestion showed that bracket transmission standards could not, because of many questions raised, be adopted forthwith; it also showed

that the television manufacturers either could not or would not adopt bracket standards. No other suggestion was advanced by any of the parties as to how a final determination of the matter could be postponed without aggravating the compatibility problem. This meant that a final decision could not safely be postponed, and hence standards for the field sequential system were adopted.

The procedure thus adopted by the Commission, in the face of the "two difficult courses of action" which were open to it (First Report, Par. 145, R. 164), was, therefore, a wholly reasonable resolution of the problems which confronted it. It represented an exercise of administrative discretion which was particularly well designed to serve the public interest, and was typical of the very kind of flexibility which the administrative process is designed to permit.

Appellants wholly distort the action of the Commission in their characterization of it (Br., pp. 128²134; see also pp. 27-28) as an attempt to coerce manufacturers or to exert illegal jurisdiction over the manufacturing of receiving apparatus. The bracket standards proposal was clearly an exploratory suggestion and a request for information concerning whether such standards were feasible and whether the manufacturers could and would build future receivers capable of receiving transmissions under such standards. Of course, the Commission's jurisdiction extends to the standards of broadcast transmissions, not to the equipment built by receiver manufacturers. But it does not follow that the Commission must close its eyes to receiver performance in discharging its functions.¹¹⁸ Thus, receiver selectivity determines such matters as allocations of channels among communities and interference ratios. To ask manufacturers of receivers if a certain type of equipment

¹¹⁸ Indeed, appellants in effect concede this, as they must, since as noted above, they have condemned the Commission's decision on the grounds, among others, that the CBS receivers utilize a disc and are limited in direct-view picture size.

can be built within a certain time, in connection with the question facing the Commission whether a final decision could safely be postponed, is not to coerce but rather to seek the very type of information which might be adduced in the course of any rule-making procedure.¹¹⁹

The actual effect of the proposal was to give a period of grace to the compatible systems. Since the Commission could have adopted the field sequential system forthwith, appellants can hardly allege injury from the fact that a plan was suggested by the Commission which would have postponed such adoption. Appellants have characterized as "illegal conditions" what in actuality was a discretionary postponement of a final decision. The Commission had decided to reject as unsatisfactory the dot sequential system and to adopt the field sequential system. The fact that the Commission sought information as to the manufacturers' willingness and ability to build sets capable of receiving bracket standard transmissions, which would have given RCA more time to improve its unsatisfactory system without precluding the adoption of the only known satisfactory system, is certainly not an illegal imposition. It is not appropriate for the very party who could derive only aid and assistance from the adoption of bracket standards so to characterize them. Cf. *Steward Machine Co. v. Davis*, 301 U. S. 548, 589-91; *Radio Cincinnati v. Federal Communications Commission*, 177 F. 2d 92, 95-96 (C. A. D. C.).

It is clear that the Commission's action, thus erroneously attacked, was reasonable and wholly within its powers. It was a carefully reasoned action based upon a full consid-

¹¹⁹ For an explanation of "bracket standards", see Statement, *supra*, pp. 26-27. It is further to be noted that the only proposal was to amend the black and white transmitting standards, and not, of course, to impose any requirement, by regulation or otherwise, that manufacturers build receivers which would be so designed as to be capable of receiving any transmissions under the bracket standards. There was never any suggestion that bracket standards would be made effective without hearing if comments substantially adverse to the proposal were received.

eration of all the relevant factors involved. It was an admittedly difficult decision, but one exactly of the nature which is within the informed competence of the administrative agency. It affords no ground whatever for condemning the order of the Commission.

D. The Commission Properly Refused to Adopt Transmission Standards Permitting Regular Broadcasting Under the RCA System.

In addition to their arguments that the Commission was in error in adopting standards for the CBS system, appellants contend (Br., pp. 97-113) that in any event, whether or not such standards were correctly adopted, the Commission could not properly refuse also to adopt standards for the RCA system in order that broadcasting under the latter system on a regular non-experimental basis might be permitted as well. Appellants thus contend that the Commission was obligated to adopt "multiple standards"—i.e., more than one set of standards under which station licensees could broadcast under either the RCA system, the CBS system, or for that matter, presumably under any other system. The precise reach of their argument, however, is unclear. Apparently appellants concede (brief in the court below, pp. 32-34) that the Commission does have power to set standards and "RCA does not now challenge the Commission's assumption a decade ago of the power to set standards." Nevertheless, though thus conceding the power, appellants appear to contend alternatively either that the Communications Act does not permit establishment of only one set of standards or that, if it does, it was an abuse of discretion in this case to refuse to adopt multiple standards.¹²⁰

¹²⁰ This argument is, of course, squarely inconsistent with appellants' argument, discussed above at pp. 93-96, that as a matter of law the Commission was required to adopt a compatible system and a single set of standards for both color television and black and white television.

At the threshold of discussion of this point, it may be noted that appellants themselves appear implicitly to recognize that the issue of multiple standards does not even arise if the Commission properly found that the RCA color pictures are unsatisfactory. Thus, appellants argue (Br., pp. 107-108) as an essential element of their contentions concerning the Commission's asserted lack of power to refuse to set standards for the RCA system, in addition to the CBS system, that the color performance of the RCA system is in fact satisfactory. But such an argument flies in the face of the Commission's findings on the color performance of the RCA system—findings which, as shown above (pp. 53-60) are amply supported and hence are decisive here. Since, accordingly, it must be accepted as a fact that RCA's color performance is unsatisfactory, appellants' basic premise, on which its contentions concerning the Commission's obligation to approve standards for both RCA and CBS hinge, falls to the ground. And with it falls the contentions themselves.

If appellants' argument is to the contrary—that multiple standards must be adopted irrespective of the quality of RCA's color performance—appellants assume an unusually heavy burden. They must establish that the Act requires particular color standards to be established even though; as the Commission found, no satisfactory color broadcast service can be rendered under these standards. Consequently they ask this Court to accept this extraordinary proposition: that, as a matter of law, the Commission must adopt color standards for a system which it has found (1) does not produce satisfactory color pictures, (2) is not sufficiently field tested, (3) is excessively susceptible to certain kinds of interference, (4) requires complex and costly receiving equipment, and (5) although so much more difficult and costly to transmit, produces black and white pictures which are not even equal to those produced by standard black and white transmissions. Nothing whatever in the Communications Act nor in the scope of the "public interest, convenience, or necessity" criterion requires any such extraordinary result.

1. *The Commission has the power, under the Communications Act, to refuse to set standards for an unsatisfactory system.*—The Commission's statutory authority to establish a single set of standards for each broadcasting service is clear. The Communications Act of 1934, as amended, authorizes the Commission, among other things to "prescribe the nature of the service to be rendered by each class of licensed stations * * * " (Section 303(b)), to "regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein" (Sec. 303(e)), and to adopt rules and regulations necessary to carry out the provisions of the Act (Sections 4(i) and 303(r)).¹²¹ These powers must be exercised "as public convenience, interest, or necessity requires" (Sec. 303, introductory clause). The Act, on its face, therefore, authorizes the Commission to set engineering standards for broadcast transmissions. Obviously, if it has such authority, it must have authority not only to select one set of standards but also to reject others. And the text of the Act further shows that, in determining what standards, if any, it shall establish, the Commission must of necessity take into account not only *transmissions* but also the effect of such transmissions at their destination, when they reach the public. For it must be plain that the purpose of the Act is not to regulate transmissions for broadcast service for their own sake; such

¹²¹ Another objective of radio regulation is to "provide for experimental uses of frequencies" (Section 303(g)), and the Commission may in furtherance of this objective and to the extent that such action is in the public interest, license persons to carry on such experimentation. But authorizing persons, working to develop new radio techniques, to operate experimentally on frequencies assigned for that limited purpose—as RCA has been and currently is authorized to operate with respect to its experimentation with a dot sequential system of color television,—is far different from licensing persons to perform a regular broadcasting service "intended to be received by the public" (see Section 3(o) of the Communications Act).

transmissions would, so far as the public interest is concerned, be a matter of indifference, unless, as Section 3(o) of the Act states, they are "intended to be received by the public." Surely it would be futile for the Act to concern itself with the "nature of the service to be rendered" by a station, or with the "external effects and the purity and sharpness of the emissions from each station and from the apparatus therein" unless the service and the emissions to be regulated are intended for the public. And this is explicitly recognized in the overriding standard of the Commission's rule-making authority—*i. e.*, that such authority must be exercised in the *public* interest, convenience and necessity.

The text of the Act, so clearly establishing the Commission's authority to choose, in the public interest, among various possible standards of transmission and to adopt that set of standards which "renders" the best "service" and the greatest "purity and sharpness" of emissions—and to consider, in its choice, not only matters relating to the "key" of transmission but also the "lock" of reception—is confirmed by the legislative history of the Act. For in the debates on the Radio Act of 1927, which contained a Section 4(e) identical to Section 303(e) of the existing Communications Act, Senator Dill, manager of the bill in the Senate, expressly stated that this provision was intended to authorize the Commission, in its discretion, and to the extent that it determined the public interest would be served thereby, to permit or refuse to permit licensees to install and utilize particular types of transmitting equipment which would have the effect of requiring members of the general public to secure particular types of special receiving equipment necessary to receive such transmissions if they wished to do so. (68 Cong. Rec. 3033-3034; see also 68 Cong. Rec. 2880-2881.)

Subsequent to the enactment of Section 4(e) of the Radio Act of 1927, the Federal Radio Commission, charged with administering that Act, promulgated a single set of stand-

ards of AM radio transmissions¹²² which, in effect, required all licensees engaged in radio broadcasting to conform to such standards, just as the proposed color television standards require all licensees broadcasting color television to conform to such proposed standards. The congressional reenactment of Section 4(e) of the Act of 1927, embodying it as Section 303(e) of the present Act (*supra*, p. 104), is, of course, congressional approval of the power, previously exercised under Section 4(e), to establish a single set of standards. Cf. *Helvering v. Winmill*, 305 U. S. 79; *Murphy Oil Co. v. Burnet*, 287 U. S. 299.

Not only the text of the Act itself and its legislative history thus establish the Commission's authority to act as it did, but the Commission's own administrative construction, followed over a long period of years,¹²³ similarly confirms such authority. For from the beginning, whenever the occasion has arisen for consideration of authorizing the regular broadcasting of a radio service, the Commission has established only a single set of standards. It did so for FM radio in 1940 (Part 3, Rules Governing Standard and High Frequency Broadcast Stations, Subpart B, Rules Covering High Frequency Broadcast Stations (5 F. R. 2382)). The Commission, in 1941, established a single set of standards for black and white television ("Report on March 20, 1941 Television Hearing" (Mimeo. 49851)). And it may be noted that such a single set of standards was set for black and white television in the face of violent disagreement among various segments of the industry as to which were the proper standards to be established (see Tr. 9526, 9535-8) and, in fact, in the face of a proposal that standards be so broadly established that more than one system could be transmitted under them (Tr. 9516-7). Thus,

¹²² Second Annual Report of Federal Radio Commission (1928), p. 20; Fourth Annual Report (1930), p. 59; Fifth Annual Report (1931), p. 6; Sixth Annual Report (1932), p. 28.

¹²³ Such construction is, of course, entitled to great weight. *United States v. American Trucking Associations*, 310 U. S. 534, 549; *Norwegian Nitrogen Products Co. v. United States*, 288 U. S. 294, 315.

as appellants themselves state (brief in court below, p. 32), it has long been "recognized in the industry that 'standardization of line and field rate was necessary to avoid a hodge-podge of different broadcasting *and receiving systems*'" (italics supplied).

Appellants appear further to contend that the Commission is without authority to preclude adoption of RCA standards in addition to CBS standards, because the RCA system is compatible and hence can be received on existing black and white sets as black and white pictures. Therefore, appellants urge, the public would not be injured if licensed broadcast stations were permitted to broadcast under the RCA system. It is beyond the authority of the Commission, appellants state (Br., p. 110), to concern itself with the fact that some member of the public may wish to buy a RCA color set capable of receiving the RCA signals in whatever quality of color RCA signals can produce.

But the fallacy of this argument has already been demonstrated. At the threshold, the basic premise is erroneous: As noted (*supra*, p. 11), even the black and white pictures received from RCA color transmissions are somewhat inferior to standard black and white pictures. Surely if the Communications Act provides, as it has been shown it does, that the Commission's concern with the "purity and sharpness" of emissions is directly related to the public's receipt of such emissions, it is hardly in the public interest to permit licensees to drain their resources in complex and inoperable equipment in order to force on the public a substitute black and white picture which is inferior to that which the public is now receiving. Further, wholly aside from the question of the quality of the service under the RCA standards as a color or black and white service, the factor of oscillator radiation interference (see *supra*, pp. 11, 68-69) also must obviously be taken into consideration. For, as the record establishes, interference of this nature may well affect the number of channels, and the arrangement of channels among communities, which are to be assigned to

television—either black and white or color (Tr. 8260-4, 10655; cf. Tr. 7596).¹²⁴ Therefore, it is clear that even on the issue of interference itself, which appellants apparently concede may be taken into account in setting standards (Reply to Motion to Affirm, p. 22), the Commission plainly had power to refuse to adopt RCA standards.

In any event, appellants' argument, that since the RCA signal can be received in black and white, no one is injured because of the quality of the color, is disingenuous. There can be no possible justification for adopting RCA color standards if the only purpose is to provide owners of black and white sets with black and white pictures. Obviously, appellants, by their very contention that RCA color standards must be adopted, necessarily assume that broadcasting under such standards would result in the

¹²⁴ Appellants' contention throughout this litigation that interference from oscillator radiation is irrelevant because the RCA system is *susceptible* to such interference, rather than *produces* such interference, is, accordingly misleading. It is true that the RCA system does not produce the interference; the difficulty is that it is peculiarly affected by the interference radiated from other television receivers, diathermy machines and other instruments (see *supra*, pp. 11, 68-69). But, so far as the signal received by the public is concerned, it is immaterial whether the defects in the picture are caused by the interference caused by the signal, or caused by the signal. Both cause and effect are inseparable parts of the problem of interference. Since the interference caused by oscillator radiation falls on specific points in the spectrum, and hence on specific channels, it thus interferes with the television signals being transmitted in those channels. Hence, as noted in the text, a major method of minimizing such interference would be to rearrange the channels which can be assigned to communities so as to remove those in which the interference falls. Adoption of the RCA system, with its excessive susceptibility to such interference, would more certainly require such rearrangement and such rearrangement would result in a lesser total number of channels available to television service as a whole (Tr. 8260-4, 10655). Thus, the public may indeed be hurt by RCA's interference characteristics since, by requiring a reduction in the total number of channels (and hence, of course, of stations), the public in particular communities would be deprived of service which it otherwise might have.

purchase of sets which are supposed to receive the color transmissions *in color*. And authorization of regular commercial operation under such a system certainly will induce the public to invest substantial sums in receiving equipment for a system of color-television which is not, and may never be, capable of producing satisfactory color pictures. Moreover, as a result of further experimentation and development and further changes in the system of producing color pictures, all sets capable of receiving RCA's present color pictures may be rendered totally obsolete. The Commission's regulatory powers to license broadcasting stations to serve the public, and to regulate the kind of transmitting apparatus to be used, cannot be tortured into a legislative prescription of the rule of *caveat emptor*.¹²⁵ Indeed, as has been shown above (p. 104) the legislative history of the Act establishes that one of the very purposes of Section 303(e) was to empower the Commission to weigh the effect of transmissions on the purchase of receivers and protect the public in such purchases to the extent that they are related to the signal transmitted.

2. *The establishment of a single standard is consistent with the Commission's statutory duty to foster competition.*—In large part, appellants' contention that the Commission can not properly refuse to adopt standards for the RCA system side by side with standards for the CBS system turns on their argument that the Commission's adop-

¹²⁵ Appellants' claim (Br., p. 109) that since the Commission has no direct jurisdiction over the manufacture of radio equipment, it thus has no concern with the types of receiving equipment which the public may, in its discretion, choose to purchase, is indeed an astounding position in view of the fact that their case against the adoption of the CBS color system is so heavily based on the adaptation and conversion costs to those members of the public who presently own black and white sets and on the asserted picture size limitations of the CBS disc receivers. But, in any event, it is clear that the fact that the Commission must inevitably consider receiver performance in fixing transmission equipment standards does not at all mean that it is exercising illegal jurisdiction over receiver manufacturing.

tion of single standards transgresses the policy of the Communications Act to foster competition. This argument not only ignores the unbroken history of the Commission's setting of single standards for each broadcasting service, but it is also squarely inconsistent with the position which appellant RCA took before the Commission. Thus, the chairman of the Board of Directors of appellant RCA testified (Tr. 10300) that adoption of single standards would provide greater inducement for research and development in color television than adoption of multiple standards because "... I feel that under the adoption of a single standard the state of the industry would be more healthy..."¹²⁶

¹²⁶ Appellants, on the same issue, now take precisely the opposite view. In their brief (p. 105), they now urge that adoption of single standards "involves the stultification of the priceless national resource of invention and research." Apparently, appellants' argument comes to nothing more than that multiple standards are required by the objective of competition if CBS standards are adopted, but that the Communications Act is indifferent to competition if single standards for the RCA system alone are adopted. Indeed, at an earlier point in his testimony, the chairman of the RCA Board had advocated precisely this "double standard" of determining whether multiple standards should be adopted. On cross-examination by Commission counsel, the following colloquy took place (Tr. 10093-10094):

"Q. Are you in favor of the Commission adopting multiple standards in this proceeding or not?

A. Well, I haven't recommended it, I would say that the question of whether I was in favor of it or not would depend to a large extent on whether it had abandoned its idea of a single system.

Q. Would you recommend the Commission to abandon its idea of a single system?

A. No. I recommended that it adopt the RCA system.

Q. Correct. And if the Commission adopts the RCA system you certainly wouldn't recommend that we also standardize on the basis of any other system?

A. No, I don't.

Q. Suppose the Commission does not adopt the RCA but adopts the CTI or CBS system.

A. Then I would recommend multiple standards in preference to that."

But, in any event, appellants are mistaken in their present contention (Br., pp. 101, 102, 106, 108) that the adoption of a single set of standards for color is forbidden because it assertedly fosters monopoly and hence transgresses the policy of the Communications Act to establish the maximum possible competition. For, as has been established in the preceding discussion, the Act plainly does permit establishing a single set of standards for each broadcasting service. Appellants' argument concerning "monopoly" ignores the nature of the subject matter which requires adoption of standards and the nature of the competition which the Commission is under an affirmative duty to promote. The limitations on the free use of radio frequencies which requires the setting of transmission standards by the Commission are imposed by the scarcity of frequencies and the need for regulation to prevent chaos in their use. In this manner, the most effective utilization of frequencies from the standpoint of technical considerations and the protection of the interest of the public as users of equipment is insured. The very purpose of the enactment of the Radio Act of 1927, 44 Stat. 1162, the basic provisions of which are incorporated in the Communications Act, was elimination of *laissez faire* in the choice of frequencies, transmission characteristics and other operating conditions which had actually led to chaos in the radio spectrum. See *National Broadcasting Company v. United States*, 319 U. S. 190, 211-214. The promotion of competition in order to insure maximum utilization of frequencies in the public interest is indeed a major purpose of the Communications Act. *Id.*, at 224. But *Federal Communications Commission v. Sanders Radio Station*, 309 U. S. 470, 474-5, mistakenly relied on by appellants (Br., pp. 101-102), makes clear that the type of competition which is calculated to achieve that objective is not the unregulated competition of superior and inferior means of signal transmissions; but rather the competition between licensees using authorized and standardized means of trans-

mission for the attention of the listening and viewing public. It is obvious enough that multiple standards for the same type of service does not expand but, rather, diminishes this type of competition in circumstances where possible reception from all stations in a given area would require that the potential listener or viewer have more than one receiving set or a combination set of prohibitive expense and complexity.

3. *The Commission was not required to make findings on the issue of "multiple standards."* It is clear from the foregoing that the Communications Act, far from requiring the Commission to adopt RCA standards, plainly contemplated authorizing the Commission to refuse to adopt standards on the very grounds on which the Commission rejected the RCA system. And, therefore, it is equally apparent that the Commission, in refusing to adopt standards for the RCA system, in addition to adopting standards for the CBS system, did not abuse its discretion but, on the contrary, acted entirely reasonably.¹²⁷ For certainly the Commission cannot be said to have been arbitrary and capricious in refusing to authorize a system in which, as the Commission found, so many defects inhered.

The short answer to the complaint (Br., pp. 103-106, 111-112) that the Commission made no finding concerning the technical feasibility or general desirability of adopting standards for more than one system is that no findings were

¹²⁷ A comprehensive statement of the dangers of, and injury caused by, multiple standards appears in the testimony of Frank Stanton, President of CBS, at Tr. 7116-34, 7219-20. Briefly summarized, his testimony shows that multiple standards would delay the introduction of color; would work a hardship on the public; would cause consumer confusion because of requiring a consumer to make his choice of programs in advance, at the time of purchase; would result in the consumer's getting only some color broadcasts, and not all; and would not result in "choice in the market place" but rather would place control of which standards are to be used in the hands of a few broadcasters and manufacturers. See also colloquy between Stanton and Commissioner Webster at Tr. 7168-71 establishing the adverse effects on station relationships and on the public if a station chose to shift from one set of color standards to another.

necessary or even called for since the Commission had found that the RCA system was so deficient that it was not in the public interest to adopt standards for it and, hence, the issue of multiple standards was never presented for decision. In other words, the Commission never reached the question whether, if the RCA system were otherwise satisfactory, standards for both RCA and CBS should be established.¹²⁸

Not only was the issue of "multiple standards" not presented by the facts; it was, moreover, not really tendered by the parties. For the witnesses who testified on the issue before the Commission were virtually unanimous in their

¹²⁸ It is for this reason that appellants' references to the decisions of this Court in *Jacob Siegel Co. v. Federal Trade Commission*, 327 U. S. 608, and *Securities and Exchange Commission v. Chenery Corporation*, 318 U. S. 80, are clearly beside the point. Aside from the fact that appellants are here complaining of a failure to make findings on an issue never posed by appellants to the Commission (see, *infra*, p. 113), those cases are readily distinguishable. If the Commission had found that both the CBS and RCA proposals met the criteria of an adequate color television system, it might possibly be argued that in the light of the *Siegel* case, it was error to fail to consider the question of multiple standards and to make findings and conclusions upon this matter. But, in the light of the Commission's determination that the RCA system did not meet the minimum prerequisites of an adequate color system, there was no occasion to consider whether regular operation by broadcast stations using the RCA system should also have been authorized. "No formal or direct comparison is necessary between an application [for a broadcast license] which must be denied and one which may be granted. Relative consideration is meaningless unless there are two applications either of which, considered alone, might be granted." *Simmons v. Federal Communications Commission*, 145 F. 2d 578, 579 (C. A. D. C.); 169 F. 2d 670, 672 (C. A. D. C.), certiorari denied 335 U. S. 846. Similarly, there is no *Chenery* issue raised by the fact that the Commission in its brief has answered the arguments made by the appellants for the first time in the court below, and never made before the Commission, with respect to simultaneous operation of both the CBS and RCA system of color television transmission—a proposal which RCA not only did not formally present in the proceedings before the Commission (*infra*, note 130, p. 112), but indeed, opposed (*supra*, p. 109), and which, in any event, need not have been reached in view of the finding that the RCA system was inadequate.

condemnation of multiple standards as impractical and confusing alike to the public and to the broadcasters. See Tr. 9685-6 (Baker); Tr. 9412, 9416 (DuMont); Tr. 8173-5 (D. B. Smith); Tr. 4701 (Lippincott); Tr. 11341 (Matthews); Tr. 7116-34, 7216-20 (Stanton).¹²⁹ In fact, as noted above (p. 109), the Chairman of the Board of appellant RCA himself explicitly testified (Tr. 10300) that ". . . I feel that under the adoption of a single standard the state of the industry would be more healthy, . . ." ¹³⁰

It is readily apparent from the foregoing, therefore, that the Commission had clear power to refuse to adopt standards for the RCA system and that its exercise of that power was wholly reasonable.

E. The Court Below Properly Sustained the Commission's Order.

Resisting what it characterized as the insistence of the Government and the Columbia Broadcasting System that the Commission's order be allowed to become effective even before it "could have an opportunity to study and decide the issues presented" (R. 877), the court below, after

¹²⁹ Appellants' attempt in the court below to show that these witnesses (other than Stanton) opposed multiple standards because they opposed standards for the CBS system is unwarranted. The testimony cited in the text establishes that while many of the witnesses opposed adoption of CBS standards, their opposition to multiple standards was based on independent criticisms of such multiple standards.

¹³⁰ It is significant also that although the Commission's Notice of May 10, 1950, stated that any proposed findings and conclusions filed by a party to the proceedings should include a "precise statement of the specific transmission standards proposed" (Tr. 1423), RCA did not propose that multiple standards should be adopted in its Proposed Findings and Conclusions. (Tr. 15748). CBS expressly recommended against the adoption of such multiple standards in its Proposed Findings and Conclusions (Tr. 15692), and while RCA did take explicit issue with many other findings, conclusions and recommendations proposed by CBS, RCA did not take issue with this recommendation in its lengthy Reply to the Proposed Findings and Conclusions of CBS (Tr. 15960).

three days of oral argument (R. 864) took this case under advisement on November 16, 1950, kept it under consideration for more than five weeks, and rendered a decision on December 22, 1950, explained in an opinion occupying 17 record pages in the record in this Court (R. 863, 864, 863-879).

That opinion (which the court below was, of course, not required to write)¹³¹ fully canvassed the issues tendered the court for decision with but a few minor exceptions hereafter to be noted. It first set out at length a statement of the case, the parties involved, the statutory basis for its jurisdiction and that of the Commission. After noting that it had entered an order suspending the Commission's order on the basis of findings of fact made by it, the court proceeded to classify the arguments made in support of the appellants' request that the order of the Commission "be set aside" (R. 865). The two "general categories" of contentions which, the court said, embraced "many subsidiary issues" were "(1) that the order is contrary to the public interest, and (2) that its adoption represents an arbitrary and capricious attitude on the part of the Commission" (R. 865).¹³²

With respect to the contentions thus classified, the court below, referring to the "many hours of oral argument by able counsel," its own "reading and study of the numerous and voluminous briefs," and its own study of "the case," pointed out that it "must give recognition to our limited scope in reviewing an order of an administrative agency"

¹³¹ "... it needs nothing but statement of the proposition to demonstrate the want of all foundation for the contention that there is ground for reversing the trial court because the court below affirmed the action of that court without opinion." *Tex. & Pac. Ry. v. Hill*, 237 U. S. 208, 215.

¹³² Mention was also made of the attack on the standing to sue of the complaining parties and intervenors other than RCA, but, for purposes of its decision, the court decided to assume such standing (R. 866).

(R. 866).¹³³ It then proceeded to cite and discuss three "recent Supreme Court opinions" which contained typical statements of the limitations on the power of a court reviewing administrative action.

In these cases it found a general and, we think, sufficient answer to appellants' two "general categories" of argument: it found its "scope of review" firmly delineated so that it was, in the words of this Court, quoted by the court below,¹³⁴ "not at liberty to substitute its own discretion for that of administrative officers who have kept within the bounds of their administrative powers. * * * Error or unwisdom is not equivalent to abuse." (R. 866).

Thus guided, the court below proceeded to a fairly detailed statement of "the proceedings which culminated in the order under attack" (R. 867). From that statement, it concluded that "while the findings of the Commission are severely criticized, it is not contended in the main that they are not supported by substantial evidence" (R. 871). And the accuracy of that statement is not only readily apparent from the briefs and arguments of appellants in the court below;¹³⁵ it is also demonstrated by the nature of

¹³³ The court at this point also referred to its inability to free its mind of the fact that its proceedings were "little more than a practice session" in view of the inevitable appeal to this Court. This comment and another similar statement in the court's opinion is discussed, *infra*, pp. 117-121.

¹³⁴ *American Telephone & Telegraph Co. v. United States*, 299 U. S. 232, 236.

¹³⁵ Analysis of appellants' briefs and arguments (filed as part of the record in this Court) in the court below establish the accuracy of the court's characterization of appellants' attack on the findings and, indeed, establish that no attack on findings was made which would have required the attention of the court. While in their main brief appellants included a point headed "The Order is Not Supported by Substantial Evidence" (p. 52), the material included in the point (pp. 52-63) comprised only an attack on the wisdom of the Commission's choice of criteria; no findings were identified as lacking in supporting evidence. At the argument before the court, appellants dealt with the substantial evidence issue only by referring the court to their brief (transcript of proceedings be-

their contentions in this Court which we have analyzed above, pp. 83-85.¹³⁶

Turning to "the merits of the case", the court below stated, that the "major portion" of appellants' argument "is predicated upon matters outside the record made before the Commission" (R. 872). Such matters, the court ruled (R. 872), were

not properly before the court. A consideration of such matters would in effect amount to a trial de novo, which we are without power to grant.¹³⁷

The court below did not again specifically advert to the charge that substantial evidence was lacking for some of the Commission's findings. For, from the sentences in its opinion immediately following the statement that there was "in the main" no substantial evidence attack,¹³⁸ it is apparent that it found this attack "most plausible" only if

fore the court below, p. 96). In their reply brief, filed after the argument, a few citations were included, but there was no attempt whatever to attack the evidence which supported the Commission's findings.

¹³⁶ In their brief (p. 137), appellants quote our motion to affirm as saying: "• • • appellants urged in the Court below, and urge here, that there was no substantial supporting evidence • • •". The Court should contrast this partial quotation with the full sentence from which it was taken (Motion to Affirm, p. 14): "Indeed, while appellants urged in the Court below, and urge here, that there was no substantial supporting evidence, they have failed to specify any of the multitude of findings alleged to be without such support."

¹³⁷ *Accord: National Broadcasting Co. v. United States*, 319 U. S. 190, 227.

¹³⁸ It is plain that the court below did all that was required of it in dealing with the appellants' evidentiary argument to the minor extent that their attack may actually have been on the issue of substantial evidence. For by its study of "the case" and its "reading and study of the numerous and voluminous briefs" (R. 866), it considered the issue on "the whole record or such portions thereof as may be cited by any party • • • [italics supplied]" as Section 10(e) of the Administrative Procedure Act requires it to do. See Appendix, *infra*, p. 155.

treated, not as an evidentiary argument, but a contention that subsequent developments after the hearings had closed had made the findings stale either as of the time the Commission's order was entered or when the hearings were held in the court below.¹³⁹ The charge, as the court below described it, was that the Commission had "abused its discretion in refusing to extend the effective date of its order so that it might further consider the situation, and particularly the improvement which it is claimed had been made by RCA and others" (R. 872).

This argument appears to have been the only contention found troublesome by the court below. For, after discussing and rejecting appellants' other complaints,¹⁴⁰ it returned to it, saying (R. 875):

*** as we evaluate the situation, there are two courses open, (1) to allow defendant's motion for a summary judgment, and (2) to vacate the order and send the proceedings back to the Commission for further consideration *in view of recent developments in the color television field as well as the rapidly changing economic situation.* [Italics supplied.]

The court below followed the first course. It rejected the second because, it said, "there may be doubt" of its power to pursue it and because adoption of such course "would inevitably result in the prolongation of the controversy which so badly needs the finality of decision which can be made only by the Supreme Court" (R. 875)¹⁴¹

¹³⁹ What appellants' contention was is not clear.

¹⁴⁰ Among the items discussed by the court below were the Condon Report (R. 872), the subpoenas *duces tecum* sought by Pilot Radio Corporation (R. 873), and the participation in the proceedings of Chapin, a Commission engineer (R. 874). These matters are discussed in this brief at pp. 130-132, pp. 149-151, and pp. 143-149. The court below also again made reference to, and again rejected, the appellants' desire to introduce evidence which was not before the Commission (R. 874).

¹⁴¹ This was merely a restatement of the court's earlier expressed inability "to free our minds of the question as to why we should devote the time and energy which the importance of the case merits,

The reasons thus stated by the court below for refusing to vacate the Commission's order certainly do not evidence any judicial abdication. The court below doubted its authority to vacate for further proceedings before the Commission and it resolved that doubt by refusing to vacate the Commission's order. That it took into account, in considering the question, the fact that the public interest would be served by having this issue resolved sooner rather than later¹⁴² does not make its action error. Nor does consideration of the desirability of a quick and final decision of the issue evidence a failure on the part of the court below fully to consider the question of law thus presented by appellants' request for further consideration by the Commission in the light of alleged new developments.

Courts are not required to express a certainty of conviction that they do not feel; they are required only to resolve questions before them with such certainty as it is in their power to achieve.¹⁴³ This the court below did: As Judge Major said during the course of the oral argument below (Tr. of Proc. p. 330) "We have got to have time, and we are going to have time to give the question that is presented here our best thought; and some time in the as near future as we can reasonably, we will render the best decision that

realizing as we must that the controversy can only be finally terminated by a decision of the Supreme Court." (R. 866).

The remainder of the opinion of the court below (R. 875-9) was devoted to the question of continuation of its stay order.

¹⁴² Appellants had not sought a permanent injunction in the court below, insisting that they were not yet ready to do so, and that, therefore, the case was not yet ripe for final adjudication in their favor (Tr. of Proc. pp. 21, 39, 323-4).

¹⁴³ "• • • it must be owned that the law upon the subject is not free from doubt. • • • The situation is one in which to proceed by any available method would not be more likely to satisfy the impalpable standard, deliberately chosen, than that we adopted in the foregoing cases: that is, to resort to our own conjecture, fallible as we must recognize it to be." L. Hand, C. J., in *Schmidt v. United States*, 177 F. 2d 450, 451 (C.A. 2).

we are capable of rendering." Consequently, the cases cited by appellants (Br., p. 140) are all inapposite, for they were all cases in which the lower court, for good reason or bad, had failed entirely "to consider the case before it." *Lutcher & Moore Lumber Co. v. Knight*, 217 U. S. 257, 268.

Consequently, the language in the opinion of the court below is certainly not sufficient warrant for a remand to the court below to resolve its doubts on this question of legal authority.¹⁴⁴ There have indeed been many instances where this Court has itself decided questions of law, certainly no less difficult than that here involved, which were not considered at all by the courts below or even argued by the parties in this Court. See, e.g., *Erie R. Co. v. Tompkins*, 304 U. S. 64, 82; *Terminiello v. Chicago*, 337 U. S. 1, 7; *Switchmen's Union v. National Mediation Board*, 320 U. S. 297, 299-300, 310-311. Resolution of the question of law

¹⁴⁴ In this connection it is important to note that the mode of review of Commission orders reviewable under Section 402(a) of the Communications Act has been changed by the provisions of the Hobbs Act, Public Law 901, 81st Cong., 2d Sess., which abolishes the statutory three-judge court and the appeal as of right, and substitutes review by a court of appeals with a limited discretionary review in this Court by writ of certiorari. The provisions of this Act are now applicable to all cases arising thirty days after December 29, 1950, its date of enactment. (See Public Law 901, 81st Cong., 2d Sess.)

In view of the fact that as a result of this statute, the responsibilities of reviewing courts in their relationship to this Court under 402(a), as well as under Section 402(b) of the Communications Act, are now clearly defined in the terms set out in the discussion in *Universal Camera Co. v. National Labor Relations Board*, No. 40, this Term, it would appear to be unnecessary for this Court, for the purposes of judicial administration in the guidance of lower courts, to plunge into an inquiry whether the relationship of a statutory three-judge court to this Court is different from that of a court of appeals. Cf. Section 402(e), Communications Act of 1934, 47 U. S. C. 402(e); Labor Management Relations Act, Sec. 10(e), 29 U. S. C. (Supp. III) 160 (e).

here presented does not require extended study¹⁴⁵ of the admittedly lengthy administrative record in this case. It requires, we think, only reiteration of the oft-repeated admonition of this Court that the question whether an administrative record is stale, whether changed conditions caused by war or defense preparations, or scientific or economic changes and fluctuations, is a question for the administrative agency's informed discretion, and that "it is not true . . . that 'the courts must in a litigated case, be the arbiters of the paramount public interest.' " *United States v. Pierce Auto Lines*, 327 U. S. 515, 535. As this Court put it in *Interstate Commerce Commission v. Jersey City*, 322 U. S. 503, 514-515:

One of the grounds of resistance to administrative orders throughout federal experience with the administrative process has been the claims of private litigants to be entitled to rehearings to bring the record up to date and meanwhile to stall the enforcement of the administrative order. Administrative consideration of evidence . . . always creates a gap between the time the record is closed and the time the administrative decision is promulgated. This is especially true if the issues are difficult, the evidence intricate, and the consideration of the case deliberate and careful. If upon the coming down of the order litigants might demand rehearings as a matter of law because some new circumstance has arisen, some new trend has been observed, or some new fact discovered, there would be little hope that the administrative process could ever be consummated in an order that would not be subject to reopening. It has been almost a rule of necessity that rehearings were not matters of right, but were pleas to discretion. And likewise it has been considered that the discretion to be invoked was that of the body making the order, and not that of a reviewing body.

¹⁴⁵ It may be noted that in *El Dorado Oil Works v. United States*, 328 U. S. 12, 13, 19, this Court sustained on its merits an order of the Interstate Commerce Commission entered on a large record notwithstanding the fact that the three-judge district court below had not passed on the merits, having disposed of the case on jurisdictional grounds.

See also 322 U. S. at 522.

From what has been said, it appears that the court below did not, as appellants put it, leave unresolved the question whether "The Commission had abused its discretion and violated statutory command in refusing to consider relevant matter submitted, at the Commission's request, after the close of the testimony but before the close of the administrative record." (Br., p. 139). Nor did the court below refuse to look at the Condon Committee Report and the RCA Progress Report (see *infra*, pp. 124-135) to "see whether the Commission had acted lawfully in refusing to consider them" (Br., p. 141). After describing the Condon Report in detail (R. 872-3), the court below ruled that the Commission had not erred in not relying on it since "Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon." With respect to the RCA Progress Report, the court below did not say that its consideration of it would constitute a trial *de novo*; it simply refused to hear witnesses "offered for the purpose of showing current developments . . . which have been called to the attention of the Commission . . ." (R. 874-5). This determination by the court below that it was not the forum for retrial of the issues of fact and policy which had been resolved by the Commission was clearly correct. *National Broadcasting Co. v. United States*, 319 U. S. 190, 227; *United States v. Pierce Auto Lines*, 327 U. S. 515, 535; *Interstate Commerce Commission v. Jersey City*, 322 U. S. 503.

It is absurd to say, as appellants do (Br., p. 138), that the court below denied the judicial review to which they were entitled by not mentioning in its opinion the appellants' variously phrased contentions on the issue of compatibility. That the court below chose properly to resolve that issue by applying the doctrine of administrative finality rather than in the terms used by appellants is not unusual in the judicial process; much less is it error.

The further contention that the court below failed to pass upon several other specific issues tendered it by the parties (Br. 139; see also appellant-intervenor Emerson's Reply to Motion to Affirm, pp. 5-9), has, in the main, already been disposed of by the foregoing discussion. For the rest, it suffices to say that the questions (1) whether the Commission should have authorized RCA color as well as CBS,¹⁴⁶ (2) whether the Commission's request for information as to "bracket standards" was so beyond its statutory authority as to void its order¹⁴⁷ and (3) whether the alleged failure of the Commission to consider relevant matter presented violated the Administrative Procedure Act,¹⁴⁸ being so lacking in substantiality (see *supra*, pp. 96-113; *infra*, pp. 132-133); hardly required discussion by the court below in the sense that its failure to discuss those questions must lead to a reversal and remand. It was not error summarily to reject what was unconvincingly advanced.

All the reasons which warranted the Commission in choosing "color now" over "compatibility" apply as well to demonstrate the public interest in a prompt termination of this litigation. Each month of delay means investment by the public in 900,000 television sets which would later require external adaptation involving a cost of millions of dollars a month in excess of the cost of such sets were they internally adapted at the factory, as they would most likely be once standards are effective (*infra*, pp. 140-142). With the record of the proceedings before the Commission and the court below now before it, and with the benefit of full briefs and oral argument, this Court is now in a position to determine that the court below properly upheld the Commission's order. It is not lightly to be assumed that a Federal court has not discharged its duties and has not given a case presented to it careful consideration, despite

¹⁴⁶ See Emerson's Reply to Motion to affirm, pp. 5, 6.

¹⁴⁷ See Emerson's Reply to Motion to affirm, pp. 7, 8, and appellants' brief, p. 139.

¹⁴⁸ See appellants' brief, p. 139.

its explicit statements that it has. In these circumstances, neither judicial administration, the requirements of justice, nor the public interest require that the case be remanded for a more artistic and extensive expression of the same correct result. Indeed, in view of the Commission's express finding that extended delay in the establishing of the color system found to be satisfactory works injury to the public (*infra*, pp. 138-140), and in view further of the fact that such delay may defeat the purpose of the administrative order itself (*infra*, p. 140) even though it may ultimately be upheld, prolongation of the proceedings in circumstances where it can and should now be terminated here would be adverse to the public interest and might even frustrate altogether the administrative action which is in issue, thus in effect determining the case without a final disposition on the merits.¹⁴⁹

¹⁴⁹ It may be noted in closing this point that appellants are in error in stating (Br., p. 58; see also pp. 39, 135) that this Court, in the *Universal Camera* case, No. 40, this Term, "noted that the Seventh Circuit had followed a standard of judicial review contrary to that which this Court has now held to be proper." The fact is, and this Court's opinion in the *Universal Camera* case reflects it, that the Seventh Circuit, like the Second Circuit, had simply held that the standard of review remained unchanged by the Administrative Procedure Act and the Taft-Hartley Act (*National Labor Relations Board v. LaSalle Steel Co.*, 178 F. 2d 829, 834 (C. A. 7)), thus indicating that that circuit had previously been applying the "record as a whole" test made explicit in the later statutes. This Court expressly refrained from disapproving the practice of those courts of appeals, "perhaps a majority" of which "have always applied the attitude reflected in this legislation." (*Universal Camera* case, slip op. p. 15).

II

THE PROCEDURES ADOPTED BY THE COMMISSION WERE REASONABLE.¹⁵⁰

A. The Commission Properly Refused to Base Any Determination on *Ex Parte* Consideration of Material Outside the Record and It Properly Failed to Reopen the Record on the Basis of Such Material.

Appellants insist (Br., pp. 115-128; see also pp. 28-30) that the Commission committed fatal error in assertedly violating "its duty . . . to inform itself and to take account of determinative facts". The "violation" arises, it is urged, from the Commission's treatment of the Condon Committee Report¹⁵¹ and the so-called RCA "Progress Report,"¹⁵² an informal report by RCA on its "progress" in its development of its color television system. Appellants' contentions on this score are not wholly clear; they

¹⁵⁰ In addition to the procedural issues discussed herein, intervenor-appellants Wells-Gardner & Co. (complaint, par. 26, R. 500) and Emerson Radio and Phonograph Corporation (complaint, par. 10-12, R. 539-40) alleged in their complaints that the Commission had improperly denied their petitions to intervene in the Commission's proceedings. The contention is not pressed here. These companies had filed petitions for intervention several months after the Commission's Notice had been issued, and after 4,000 pages of testimony had already been taken (Tr. 1182, 1223, 1227), despite the fact that the Notice had specifically provided for the method by which, and time within which, parties could appear and participate (Par. 15(a), R. 22-3). Further, neither petition pointed to any matters concerning which the petitioners had any new or relevant evidence which had not already been fully canvassed. The Commission denied the petition on these grounds (Tr. 1257, 1291). Its action was plainly reasonable. *Allen Co. v. Cash Register Co.*, 322 U. S. 137, 142.

¹⁵¹ Report of the Advisory Committee on Color Television to the Senate Committee on Interstate and Foreign Commerce, S. Doc. 197, 81st Cong., 2d Sess.

¹⁵² To the extent that appellants' allegation of error is also predicated on the Commission's denial of RCA's petition of October 4, 1950, requesting that final determination be postponed until after June 30, 1951, it is discussed below in Point II B.

appear to argue alternatively that the Commission's alleged error lay either in its failure to consider these reports *ex parte* or in its failure *sua sponte* to reopen the record for their inclusion and consideration. Whatever the contention, however, it is clear that the Commission's treatment of these reports was wholly proper.

The RCA "Progress Report" (R. 399) was informally transmitted to the Commission on July 31, 1950, more than two months after the hearing had been closed. In the letter of transmittal accompanying the Report, it was stated (R. 399) that the Report "was prepared for the information of the radio industry" and that "It is expected that additional reports of this kind will be distributed from time to time. As they are issued, copies will be sent to the Commission for the information of the members and its staff". RCA did not, either explicitly or implicitly, request that the record be reopened or that the decision be delayed for the consideration of this Report or its promised successors. On the contrary, two days later, the Chairman of the Board of RCA expressly negated any such possible inference by addressing a letter (Tr. 16220; R. 699) to the Chairman of the Commission stating that "Items have appeared in the trade press that there are those who are in favor of delaying the disposition of this matter by the Commission. On behalf of RCA and NBC we wish to reiterate that we have not and do not favor any delay in the establishment by the FCC, of commercial standards for color television."

On September 28, 1950, almost a month after the First Report had been issued, RCA again submitted the Progress Report and, for the first time, it also submitted the Condon Committee Report (R. 330), which had been issued a month and a half before. These reports were submitted as an appendix to RCA's comments (R. 289) filed in response to the Commission's Second Notice of Further Proposed Rule Making (R. 288A). That Notice, directed only to the question of bracket standards (*supra*, 27), was

limited to proposing such standards and requesting comments thereon. The reports, thus gratuitously appended to RCA's comments, were, of course, not responsive to the Notice and indeed were wholly irrelevant to it.

Once again, these reports were unaccompanied by any clear request that the record be reopened¹⁵³ or that the decision be delayed for their consideration.

As will be shown, the Commission was clearly correct in refusing to rely *ex parte* on matters not of record in reaching its decision (cf. First Report, Paragraph 148, R. 165); it was equally correct in not reopening the record to receive these documents.¹⁵⁴

1. *The Commission properly refused to base any determination on the ex parte consideration of the Progress and Condon Committee Reports.*—The RCA Progress Report, which as has been noted, was a report to the radio industry copies of which were also informally transmitted to the Commission, included a number of claims by RCA concerning alleged improvements since the close of the hearings. It claimed (1) that the tri-color tube had been developed so that it achieved brightness of "more than 20-ft. lamberts", "substantially eliminated" moire pattern and dot structure (see *supra*, p. 62) and embodied 600,000 phosphor dots instead of the original 351,000 dots, thus in-

¹⁵³ See *infra*, pp. 133-134.

¹⁵⁴ It is to be noted that these are the only issues and not, as appellants appear to contend, whether the Commission altogether ignored the reports. For the Commission did not ignore these reports, and was aware of their nature: It stated in its Second Report (Par. 9, R. 416): "... we have carefully considered all the material set forth in the comments, filed pursuant to our notice concerning bracket standards, as they are directed to the findings and conclusions in the Commission's First Report relating to the three color systems. Most of this material is merely a restatement of the parties' contentions made over and over again during the course of the hearings. These contentions have been analyzed in detail in the Report and no further discussion of them is necessary here." To the extent that additional contentions were made, the Commission discussed them in Paragraphs 10 and 11 of the Second Report (R. 417).

creasing its resolution; and that additional research work on the tube was continuing (R. 401); (2) that receiver circuits had been developed which "are simpler and more stable" and would shortly "be available for testing in the Washington area" (R. 401); (3) that "improved transmitter sampling techniques have been developed" and "work is in progress on several types of studio and field cameras", which are "in various stages of development" and would be tested when completed (R. 402); (4) that "improved equipment for 2.4 mc. sampling is being installed in Washington for further field test and refinement of color transmission over existing coaxial cable circuits" (R. 403); (5) that RCA color was being broadcast in Washington (R. 403); and (6) that "the problem of oscillator radiation should be dealt with as a matter of receiver design" and RCA "has devised improved circuits to reduce this radiation" (R. 404).

This report, even though intended for industry consumption as a statement of progress, in considerable measure was simply a reiteration of claims of improvement *in futuro* which RCA had already made at the hearings and which, the report itself stated, involved matters which were still to be tested or to be further developed.¹⁵⁵ The report was wholly devoid of any unequivocal claims or descriptions of actual accomplishments in respect of such basically unsatisfactory characteristics of the RCA system as poor color fidelity, misregistration (particularly at the camera),

¹⁵⁵ For example, the Report stated that "work is in progress on several types of studio and field cameras" including a camera using a single image orthicon. At the very outset of the hearing, RCA had similarly testified that a field camera was being developed (Tr. 2718, 2818; 6034-6), but no field camera was ever demonstrated to the Commission. Similarly, if the reference in the Progress Report to a single image orthicon meant a color camera with one tube (mosaic) which would solve misregistration difficulties, this bare statement was hardly persuasive in the absence of some explanation in respect of how a single tube camera could be used with a system using mixed highs, since such a system by its very nature requires a simultaneous camera pickup of three color signals (First Report Par. 83, R. 140; Tr. 9297, 9298-9, 11252-4) and hence, presumably requires three camera tubes or their equivalent.

criticalness of color control and excessive susceptibility to oscillator radiation interference which the Commission found, among others, to exist in the RCA system.¹⁵⁶

Whatever the subject matter of the claims embodied in the Progress Report, moreover, the Commission was not bound to accept these claims—either present or in fu-

¹⁵⁶ The only claims in the Progress Report of actual accomplishment which were not stated to require further testing or development were the achievement of receiver brightness of 20-foot lamberts and an increase in the number of dots on the tri-color tube from 351,000 to 600,000. But the Commission had explicitly found (First Report, Par. 76; R. 137) that RCA could “undoubtedly” develop receiver equipment with higher brightness than demonstrated, although there was question whether “much higher brightness” could be achieved on the tri-color tube. In any event, in its conclusions, the Commission did not assign inadequate brightness as one of the grounds for rejecting the RCA system (First Report, Pars. 132-138, R. 159-62; Second Report, Par. 3, R. 414). Further, while the Commission found (First Report, Pars. 116, 134, R. 153, 160) that, as demonstrated, the tube had an insufficient number of dots, it did not in any way indicate (as it did in respect of many other RCA deficiencies) that this inadequacy could not be remedied. It is also to be noted that the effect of an inadequate number of dots is lowered resolution, and resolution was not a factor upon which the Commission based its rejection of the RCA system (First Report, Pars. 132-138, R. 159-62; Second Report, Par. 3, R. 414). Clearly, neither of these two “accomplishments” affected the basic deficiencies which the Commission found to exist in the RCA system.

While the Progress Report claimed “substantial elimination” of dot structure, the Commission had explicitly recognized that dot structure might be minimized—although probably at the cost of other factors (First Report, Pars. 97 and 133, R. 144, 160). The Progress Report made no mention of the effect on these other factors of the alleged “substantial elimination” of dot structure.

As for oscillator radiation, it is to be noted that the Progress Report comments dealt not with the excessive *susceptibility* of the RCA color system to such interference, but to steps assertedly being taken to reduce the intensity of interfering *transmissions* by other receivers. Oscillator radiation is caused by other receivers and the Progress Report made no claims that RCA color transmissions could be made less *susceptible* to offending transmissions. RCA can hardly claim that it can control the construction of all black and white receivers, diathermy machines and other radiating instruments made by other manufacturers; yet only by such control could RCA eliminate the problem of radiation.

turo—at their face value as a basis for making findings or reconsidering its First Report. The record discloses a persistent history of prior claims by RCA which had never been fulfilled. Thus in 1946, RCA witnesses had stated that RCA had “established beyond question” the basic principles of a “simultaneous” color television system, and that standards could be set for that system within eighteen months (Docket 7896, pp. 646, 664, 1329, incorporated by reference in present hearing (Tr. 2004) and cited in separate opinion of Commissioner Jones (R. 246, 276-81)). Yet no standards were ever set for that system (Tr. 10343-4) which in fact proved to be a failure even before it emerged from the laboratory. (R. 163) Further, RCA’s witnesses in this hearing testified in September 1949 that a field camera would be completed by spring (Tr. 2718, 2818); yet no field camera was ever demonstrated (Tr. 9352). Similarly, an RCA witness, on September 29, 1949, flatly claimed that RCA had “successfully achieved” its objective of a system with high performance standards (Tr. 2657); later, and after its first demonstration on October 10, 1949, the same RCA witness testified that at the time of that demonstration, RCA had not yet proceeded far enough in its development program to be able to substantiate its theories (Tr. 6131).

In the light of these circumstances, either singly or in combination, it clearly was not an abuse of discretion or otherwise illegal for the Commission to have refused to take the Progress Report into consideration as a basis for its determination. To have adopted such a course would have involved throwing *ex parte* material into hotchpot with the evidence adduced at the formal hearing. It would have substantially negated the Commission’s deliberate choice of submitting all the evidence and opinions on the color television issues to the exacting crucible of open hearings, sworn testimony, the personal appearance of witnesses, and cross-examination. Whether or not *ex parte* reliance on the report ever would have been permissible as a matter of due process (and it may be noted that RCA

was quick to claim that in these very hearings due process required full right of cross-examination (Tr. 11698-11711)), in the light of the failure of RCA to have requested such consideration, in the light of the nature of the Progress Report itself and the equivocal or relatively insubstantial claims it made, and in the light of the past history of RCA's failure to match claims by performance, it is clear that the Commission was not in error in refusing to rely on the Progress Report as a basis for its decision without reopening the record.

Similarly, the Commission clearly did not abuse its discretion in refusing to rely, without reopening the record, on the Condon Committee Report as a basis for its decision. That report, while issued on July 10, 1950, was not submitted by RCA to the Commission until September 29, 1950—almost a month after the Commission had issued its First Report. As in the case of the second submission of the Progress Report, the Condon Committee Report was gratuitously appended by RCA to its comments of September 28, 1950 (R. 330) and was equally unresponsive to the Commission's Notice pursuant to which the comments purported to be filed.

The Condon Committee Report was not such as to require the Commission, at so late a date and on the eve of its Second Report, to consider it *sua sponte* and *ex parte* as a basis for new findings and conclusions. The Condon Committee Report had been prepared at the request of the Chairman of the Senate Committee on Interstate and Foreign Commerce and was intended to advise him concerning the status of color television (R. 332-5). Its consideration of that question was on a wholly different basis than that of the Commission, for, as the Condon Committee Report stated (R. 335), "no recommendation for the adoption of a specific system is given, since the committee believes that the decision to adopt a system must include consideration of many social and economic factors not properly the concern of the technical analyst." Such factors,

of course, were necessarily the concern of the Commission. Thus the Condon Committee Report was more concerned with the ultimate theoretical potentialities of the several color systems than with the economic, social and practical problems involved in achieving these potentialities.

Further, the Condon Committee Report referred to no new evidence relating to the systems before the Commission. Indeed, the Committee expressly stated that its evaluation of the systems was based on only a part of the evidence which was before the Commission—solely on the demonstrations of the systems, including the demonstrations on the record before the Commission (R. 336), and, in the case of each system, *on the testimony submitted to the Commission by the proponent of that system*¹⁵⁷ (R. 354, 358, 364). Thus, the more critical analyses by less partial witnesses were not considered by the Committee. And the significance of this basis of the Committee's consideration is underscored by the fact that what points of difference there were between the conclusions of the Committee and those of the Commission related primarily to the *theoretical* potentialities of the RCA system rather than to its achieved performance.¹⁵⁸

In view of the different functions of the Commission and the Committee, the different fundamental approaches of each, and the fact that the latter considered the issues largely on the basis of the claims of the proponents themselves, without taking into consideration the opposing evidence which was so important, particularly in evaluating the RCA claims, it is clear that the Commission was not required to consider, *suâ sponte* and without reopening the record, the Condon Committee Report as a basis for its

¹⁵⁷ Thus, Paragraph 25 of the Committee Report states that the information included in the report concerning the RCA system "is based on the testimony submitted by the Radio Corp. of America to the FCC during the color-television hearing, and on demonstrations of the RCA system witnessed by members of the Committee prior to May 1, 1950" [italics supplied] (R. 364).

¹⁵⁸ For example, the Committee noted (R. 368) that "The color fidelity demonstrated in the RCA system was considered by the

decision. For, as the court below stated in respect of the Condon Committee Report, "After all, Congress has conferred upon the Commission and charged it with the responsibility of conducting hearings and in reaching its own independent conclusions predicated thereon" (R. 873).

Nor does Section 4(b) of the Administrative Procedure Act (60 Stat. 238, 5 U. S. C. 1003(b)) (Appendix A, *infra*, pp. 154-155) require a different conclusion in respect of the Commission's refusal to base its decision in whole or in part on the RCA Progress Report or the Condon Committee Report. Section 4(b) provides that where notice is required under the Act "the agency shall afford interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, *after consideration of all relevant matter presented*, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose" [italics supplied.]¹⁵⁹

It is obvious from the text of Section 4(b) that the clause "after consideration of all relevant matter" does not require an agency which in fact has chosen to hold a formal hearing involving sworn testimony subject to cross-examination to consider not only the evidence so adduced but to consider equally *ex parte* material submitted after the close of such a hearing. The "relevant matter" which the subsection requires to be considered is that presented in *informal* rule-making proceedings limited to "written data, views, or arguments."

It would take the use of the plainest language by the Congress to justify the conclusion that the efficacy and protection afforded by formal rule-making hearings, when voluntarily held, must nevertheless be undermined by the

¹⁵⁹ The provisions of this subsection, however, are made inapplicable to rule-making proceedings in which hearings are required. See *supra*, pp. 43-44.

agency's consideration as a basis of its decisions of *ex parte* material submitted after the hearing is closed. The text of Section 4(b) coincides with common sense in establishing that no such bizarre result is compelled.

2. *The Commission's failure to reopen the record on the basis of the Progress and Condon Committee Reports was reasonable and proper.*—As noted above, appellants also appear to contend that if it was not error for the Commission to refuse to consider the Progress and Condon Committee Reports as a basis for its determination without reopening the record, it was error for the Commission to have failed *sua sponte* to reopen the record on the receipt of these documents in order to admit and consider them. Thus it appears that appellants argue that the Commission fatally erred in failing to do what RCA so carefully refrained from asking the Commission to do, and, indeed, in the case of the Progress Report, what the Chairman of the Board of RCA explicitly repudiated doing (see *supra*, p. 125).

Appellants contend (Br., p. 122) that in RCA's comments to which the Condon Committee and Progress Reports were appended, "RCA specifically invited the attention of the Commission to its duty to consider the facts stated" in these Reports; on this basis they claim that they asked the Commission to reopen. Appellants' contention is based on the presence, at p. 14 of their 52 page document entitled "Comments of Radio Corporation of America," of a statement that "We believe that in a rule-making proceeding of the importance of this one, it is the duty of the Commission, before making findings at odds with those of a group of scientists of the stature of the Condon Committee, to keep the record open and to inform itself as to the basis for the findings of the Committee. We believe that, in the circumstances, the Commission had the same obligation with respect to the RCA Progress Report." At no other point in the comments, including the "Conclusion" (R. 316), was there any other reference to reopening.

Plainly, this was not enough to constitute such a request for reopening as required, as a matter of procedure, or even justified, action by the Commission, especially in the light of the letter previously addressed by RCA's Chairman to the Chairman of the Commission (*supra*, p. 125). Parties cannot thus bury and equivocate their positions and then later complain that an agency was in error in failing to do what was never unambiguously asked of it.

Nor can the RCA petition of October 4, 1950 (*infra*, p. 135), properly be regarded as a request to reopen to receive the Progress Report or new evidence. As will be shown below (pp. 135-137), the petition asked merely that the Commission hold the record open until June 30, 1951, so that by *the latter time* RCA could come forward with new evidence. The petition contained no offer to show any matter at the time of the petition, and no request that at that time the Commission hear or view anything.

It would be novel indeed to conclude that in such circumstances, error was committed in failing to reopen the record. But no such novel conclusion is warranted.

For, as already noted, neither the Progress Report nor the Condon Committee Report embodied material, the nature of which was such as to require the Commission further to prolong the already extensive and exhaustive proceedings by reopening the record. In the case of the Progress Report, there were no offers of proof but only oft-reiterated claims either of present improvements in non-essential matters or improvements yet to be completed and tested. Clearly, if mere claims in so dynamic a field as television required reopening, there could never be an end to the proceedings (see *infra*, pp. 137, 139). In the case of the Condon Report, there was only the fact that a different group of individuals, with wholly different functions, with a wholly different basis of approach, and upon the basis of only part of the evidence which the Commission had before it, had come to somewhat different judgments than the Commission on some matters.

Whether an administrative agency should reopen a record for the purpose of admitting new evidence is a matter within its discretion. Only a showing of the clearest abuse of discretion warrants a finding of error. *United States v. Pierce Auto Freight Lines*, 327 U. S. 515; *Interstate Commerce Commission v. City of Jersey City*, 322 U. S. 503. Particularly in the light of the extensive hearing already had, and also in the light further of the adverse effects upon the public interest arising from additional delay which would have threatened the very heart of the Commission's determination (see *infra*, pp. 138, 140-142), the Commission's failure *sua sponte* to reopen the record to consider the Progress and Condon Committee Reports plainly does not justify judicial intervention.

B. The Commission's Denial of RCA's Petition to Postpone Decision Was a Reasonable Exercise of Its Discretion.

On October 4, 1950, one month after the issuance of the First Report, and when it had become apparent, on the basis of the comments which had been received on bracket standards, that the Commission was about to adopt color standards for the CBS system as it had announced in the First Report that it would do (*supra*, pp. 26-27), RCA filed a petition requesting the Commission to postpone a determination until after June 30, 1951 (R. 408). The petition requested the Commission

(a) during the period December 5, 1950 to January 5, 1951, to review the improvements made in the performance of the RCA system; and

(b) during the period to June 30, 1951, to view experimental broadcasts of color signals under the RCA, CBS, CTI and other systems, before making a final determination in respect of color standards.

The petition was *not* that the Commission at that time take any new evidence or attend any new demonstrations.

Rather, in essence, the petition was a request that the Commission postpone decision and some nine months later, start over again, for the petition contemplated not only the consideration of systems already considered but also "other systems": It must have contemplated, therefore, that, at the conclusion of the experimental broadcasts which were to continue until June 30, 1951, new hearings would necessarily be held (see First Report, Par. 148, R. 166, in which the Commission had expressly noted that "one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing . . .").

To support this extraordinary request, RCA set forth only the barest of reasons.¹⁶⁰ The petition (R. 408) stated only that since the Commission "felt the most desirable course to follow was to allow more time for the development of all color systems," subject only to the adoption of bracket standards and the building of bracket standard receivers, and since such standards and receivers had proven to be "impractical," the Commission should "now allow that time."¹⁶¹ The petition also announced that during the period December 5 to January 5,

¹⁶⁰ The request for delay was wholly inconsistent with the testimony of the Chairman of RCA's Board of Directors. He stated in May 1950 (Tr. 10555), that whatever delay might occur thereafter in setting standards for color television could not be attributed to RCA, because RCA was ready immediately to proceed; he told the Commission "Give us the green light and we will go ahead with commercial television and take a chance on whether we can live up to the promises and proposals we have made." Again, at Tr. 10603, the same witness testified that he was opposed to delay in setting standards because the quickest progress would be made by immediate authorization of color television on a regular commercial basis.

¹⁶¹ The argument is, of course, a complete inversion of the Commission's reasoning in the First Report. The Commission had stated that further postponement should *not* be permitted, and CBS standards should be *immediately* adopted, if bracket standards could not be promptly adopted. This is quite different from RCA's statement that since bracket standards could not be adopted, decision should be postponed.

* * * we will show the Commission the improvements made in the performance of the RCA system, with particular reference to those points about which the Commission expressed doubts. Some of those improvements are set forth in the RCA Progress Report of July 31, 1950.

By June 30, 1951, we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, fully-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards.

On October 10, 1950, simultaneously with the issuance of its Second Report, the Commission denied RCA's petition (R. 410). In its denial, the Commission reviewed the extensive proceedings which culminated in the First Report, and it noted that in that Report it had specified the terms and conditions under which it would give consideration to new proposed color systems and under which it might consider reopening the record.¹⁶² It further stated (R. 411) that RCA—

* * * has had a full and fair opportunity to present its proposals to the Commission; that the state of the television art is such that new ideas and new inventions are matters of weekly, even daily occurrence; that the question of approving a color television system which will best serve the interests of the American people is one which has been before the Commission for almost 10 years; that in all proceedings such as the instant one a point is reached which calls for administrative finality with respect to the Commission's hearing proc-

¹⁶² In its First Report, the Commission had stated (Par. 154, R. 169), that if bracket standards could be adopted, and bracket standard receivers could be built promptly, it would consider new or improved color systems if the proponent of such a system delivered receiving equipment to the Commission laboratory by December 5, 1950, and if the proponent conducted a series of demonstrations which would show "to the Commission's satisfaction that, in its judgment, the system had a reasonable prospect of satisfying all the criteria for a color television system set forth in Paragraph 122" (see *supra*, p. 14, note 18).

esses; and that in the sound discretion of the Commission a delay in reaching a determination with respect to the adoption of standards for a color television service as requested in the instant petition would not be conducive to the orderly and expeditious dispatch of the Commission's business and would not best serve the ends of justice; * * *

Further, as the Commission noted in its Second Report (Par. 15, R. 419-20):

* * * a new television system is not entitled to a hearing or a reopening of a hearing simply on the basis of a paper presentation. In the radio field many theoretical systems exist and can be described on paper but it is a long step from this process to successful operation. There can be no assurance that a system is going to work until the apparatus has been built and has been tested. None of the new systems or improvements in systems meet these tests so as to warrant reopening of the hearing.

Thus, as the Second Report and the order denying the petition so clearly establish, the refusal to postpone the Commission's determination was wholly reasonable and not such an abuse of discretion as, under settled principles (see *supra*, p. 120) would permit reversal.

For, after 10,000 pages of testimony, 265 exhibits, hearings covering nine months, eight demonstrations, a thorough canvassing of all views, and a painstaking and comprehensive report analyzing the several systems, the Commission had before it RCA's bare assertion, unsupported by any facts or any concrete claims of new improvement, that if the Commission would wait another nine months, RCA would be able to demonstrate a system which it had announced, in terms almost identical to those used in the petition for delay, as "successfully achieved" at the opening of the hearings in September 1949—over a year earlier (Tr. 2657; see also Exhibits 206 and 209).

Thus RCA was claiming on October 4, 1950, that it could, by June 30, 1951, reach a stage of development which, long

before, it had already claimed it had reached.¹⁶³ And, in any event, in judging RCA's claims in its petition, the Commission had before it RCA's history, already noted (*supra*, pp. 128-129), of unfulfilled claims and promises.

To have postponed determination on a basis such as that presented by RCA would have threatened perpetual indecision for, as the Commission noted, the radio field is dynamic, there are constant developments,¹⁶⁴ and there must be a stopping point somewhere if standards are ever to be set.¹⁶⁵ And where that stopping point is reached is a determination within the particular province of the Commission.

The reasonableness of the Commission's determination that the stopping point had been reached, and that the RCA petition did not justify moving it further along the calendar of years, is particularly confirmed by the adverse effects of delay, which the Commission had previously noted in detail. In its First Report, issued prior to RCA's petition, the Commission had stated (Par. 148, R. 166) that it could not

¹⁶³ Exhibit 209, submitted by RCA on September 27, 1949, was a description of the RCA system, and was entitled "A Six-Megacycle Compatible High-Definition Color Television System." In Exhibit 206 (Sept. 27, 1949), RCA had stated that its new system was "created" and "developed." Long before October 4, 1950, RCA witnesses had also testified that the system was available for immediate adoption of final standards (see Tr. 6125, 6148, 10079, 10555, 10721-8, 10731, 10875; see also Tr. 2781).

¹⁶⁴ That constant new developments and claims follow on each other's heels so rapidly is confirmed by appellants themselves (Br., p. 16), who point out that in the period of four and one-half months between May 26, 1950, and October 10, 1950, no less than three new or improved systems had been claimed as in progress.

¹⁶⁵ It is significant that this view is supported by a wholly independent electronics expert who testified at the hearing. Dr. Charles W. Geer, Professor of Physics at the University of Southern California, testified (Tr. 3937), "I believe we have to decide to go ahead if we are going to go ahead, and if we decide to wait, when we come to the place where three roads open ahead of us—if we wait and stay at the place where those three roads branch out until we know all the facts about everything along each of the three roads, we will never get the car started" (italics supplied).

overlook the obvious fact that one of the easiest methods of defeating an incompatible system is to keep on devising new compatible systems in the hope that each new one will mean a lengthy hearing so that eventually the mere passage of time overpowers the incompatible system by the sheer weight of receivers in the hands of the public.

So, too, in its Second Report, the Commission stated (Par. 15, R. 420) that to reopen the record on the basis of mere claims of improved compatible systems

would be inviting the risk that these new systems might fail as have all color systems in the past which we have been urged to adopt on the ground of compatibility and the increase in the number of receivers in the hands of the public would make it exceedingly difficult to adopt an incompatible system—a system which we know is satisfactory.

Thus, at the worst, the lengthy postponement requested by RCA might have meant depriving the public of color television altogether. For, as the Commission had found, the defects in the RCA system were inherent and it was exceedingly doubtful that they could be remedied (*supra*, pp. 14-15). It had also found that it was unlikely, on the basis of experience, that a satisfactory compatible system could ever be devised (First Report, Par. 123, R. 156): If, therefore, as the record and the Commission's past experience so strongly indicated, a satisfactory compatible system were not achieved during the period of postponement; and if, further, during the interim, the number of black and white receivers in the hands of the public had increased to so great a number that it would be impracticable to adopt such a system, color television would be lost to the public for an indefinite time.

At the best, on the other hand, postponement as requested by RCA would have meant an enormous added obstacle to the transition to color television and a huge economic bur-

den to the public. At the time of the Commission's First Report on September 1, 1950, there were 7,000,000 black and white receivers in the hands of the public (First Report, Par. 124, R. 156). The appellants themselves establish the rapid accentuation of the compatibility problem despite the Korean War. Thus they estimate that there were more than 8,000,000 such sets in the hands of the public as of October 1, 1950 (Complaint, Par. 18, R. 4), that there were 9,000,000 such sets in the hands of the public, as of November 20, 1950, and that there were 12,000,000 such sets as of March 1951 (Br., p. 8). According to appellants themselves, therefore, the problem of incompatibility had, since the Commission's First Report and during this litigation, increased at the rate of about 900,000 sets a month. At that rate, the number of black and white sets would have increased by 8,100,000 between October 4, 1950, the date of RCA's petition, and June 30, 1951, the *minimum* date of postponement requested by it.

Since the Commission found that the lowest estimates of the cost of *externally* adapting existing black and white sets so as to enable them to receive CBS color in black and white was \$32 to \$50 (First Report, Par. 105, R. 147), and since according to RCA's own testimony, if new black and white sets were adapted *internally* at the time of manufacture the cost would only be \$7 to \$10 (Tr. 10091; Ex. 408, pp. 29-30, Tr. 9617), the huge cost to the public which would have been involved in postponement until some indefinite date beyond June 30, 1951, can be roughly estimated by comparing the difference in total cost of internal adaptation, which may be assumed once standards are in effect, and external adaptation, which would be required for sets sold before standards are established. This cost involved in postponement *only until June 30, 1951*, and without taking into account the protracted period involved after June 30, 1951, in further hearings, administrative determination, and the termination of the inevitable consequent litigation,

would be a minimum of approximately \$178,200,000 and a maximum of \$348,360,000.¹⁶⁶

In the face of these facts—the possible loss to the public of color television for an indefinite period at the most, and the possible cost of additional tens of millions of dollars at the least—a petition for postponement would be required to set forth exceedingly persuasive facts indeed. RCA's petition made no such showing whatever.

In the light of all the circumstances, accordingly, it is plain that the Commission's denial of RCA's petition was on the basis of full consideration of all the relevant factors and was a wholly reasonable exercise of its discretion and entirely consonant with, if not in fact required by, the public interest.¹⁶⁷

¹⁶⁶ The total cost of *externally* adapting 8,100,000 sets (i. e., the number of sets sold between October 1950 and June 30, 1951, if sold at the present rate of 900,000 a month) at \$32 to \$50 each is \$259,200,000 to \$405,000,000. The total cost of *internally* adapting 8,100,000 sets at \$7 to \$10 is \$56,700,000 to \$81,000,000. The two figures in the text represent (1) the difference between RCA's highest estimated cost of internally adapting sets and the lowest estimated cost of externally adapting existing sets; and (2) the difference between RCA's lowest estimated cost of internally adapting sets and the highest estimated cost of externally adapting existing receivers.

As noted in the text, the total cost figures assume, as the Commission did (First Report, Par. 124, note, R. 157), that once the color standards become effective, manufacturers will then produce internally adapted sets so that the public will be able to receive all broadcasts, whether black and white transmissions under the present standards or color transmissions under the new standards. To the extent that manufacturers do not internally adapt sets (as RCA has stated it would refuse to do—Tr. 10048-9, 10419-20, 10428) and the public nevertheless purchases such sets even though they cannot receive all authorized broadcasts, the figures in the text must be reduced.

¹⁶⁷ The factors which led the Commission to decide against further delay in the adoption of standards based on the field sequential color system bear equally on the question of delay in their becoming effective by virtue of restraining action taken by the court below. These arguments were presented to the court below by appellees in opposing the issuance of a preliminary injunction. After its decision, the court below did, however, without being so requested by any of the parties or intervenors, stay the effective-

C. The Participation in the Proceedings of Chapin, a Commission Staff Engineer, was Proper and Did Not Vitate the Commission's Order.

Appellants assert (Br., pp. 24-27, 142-145) that the Commission's proceedings culminating in the order here in issue were vitiated, and hence the order rendered invalid, because Edward W. Chapin, the Chief of the Commission's Laboratory Division,¹⁶⁸ continued to participate in the hearings although he had invented a device usable with the CBS system. The contention is without substance either in fact or in law.

ness of the Commission's order until April 1, 1951, or until terminated by this Court. In the interests of securing a speedy determination of the entire matter by this Court, appellees have not challenged this order. It is clear, however, that the harm caused to the public by delay in the adoption of standards is as real now as at the time of the Commission's decision. Further, it should be noted that the decision of the court below is based, at least in part, on its notions concerning the existing economic situation—a matter which was not, and could not properly be, a matter for the court's consideration in this context. The question of the allocation of critical materials to promote the national defense had been specifically delegated to the President by Congress (Defense Production Act of 1950, Pub. Law 774, 81st Cong., 2nd Sess.) and by him to the National Production Authority. (See Commerce Department Order No. 123, 15 F. R. 6182, Sept. 11, 1950). The National Production Authority has not issued any orders establishing priority of use among civilian uses of any critical materials which may be available for the production of any kind of television receiver after defense needs have been satisfied. And, as noted in the text, appellants' own pleadings, affidavits and briefs establish that the problem of incompatibility is continuing to be aggravated at the rate of 900,000 receivers a month.

¹⁶⁸ Section 0.30 of the Commission's Statement of Organization (formerly Sec. 1.37 of the Commission's Rules, 47 C. F. R. (1946 Supp.) Sec. 1.37), issued pursuant to Section 3(a)(1) of the Administrative Procedure Act, describes the functions of the Commission's Laboratory Division. In general, the functions are: to develop, investigate and complete field studies, surveys and tests, resulting in the accumulation of engineering data in the field of communications; to design and assemble apparatus for special tests and studies; and to determine capabilities of new equipment.

The device involved is an automatic scanning adapter invented by Mr. Chapin and Willmar K. Roberts, his assistant, in the course of their assigned duties in connection with color television at the Commission's laboratory.¹⁶⁹ As initially presented by CBS, the CBS receivers required manual switching—the manual pressing of a button—in order to adjust the set when the signal to be received changed from CBS color signals to standard black and white signals, or vice versa (Tr. 3219-20). The Chapin-Roberts invention is designed to permit a television receiver, including a CBS receiver, to choose and adjust automatically between different sets of transmission standards, thus obviating any manual operation in order to accomplish the switching.

According to the testimony of RCA's own witness, Dr. George H. Brown, the device was not usable exclusively with the CBS system. Although he later filed an affidavit, dated November 13, 1950, in the court below repudiating his testimony as "facetious" (R. 765), in the hearings before the Commission and after the disclosure of the Chapin-Roberts invention, Dr. Brown testified that RCA was using a "Chapin converter" in RCA receivers in order to eliminate the dot sampling in such receivers when the transmitted signal switched from RCA color to standard black and white (Tr. 7598, 7599).

On November 22, 1949, during the hearings on the color television issues, the facts concerning the invention were completely disclosed on the record (Tr. 5980-5987), the invention itself was demonstrated, and the Commission offered in evidence a diagram of the automatic scanning

¹⁶⁹ On October 18, 1949, the Chairman of the Commission made a request on the record that the proponents of the systems deliver receivers to the Commission's laboratory by October 27, 1949 (Tr. 4184-6). The purpose was to permit the Commission to test these receivers (Tr. 4777). CBS agreed to deliver receivers by the date specified, and did so (Tr. 4773-4). RCA, although it had previously conducted demonstrations, replied that it could not deliver receivers until January 15, 1950 (Tr. 4774-6, 5982). RCA did not deliver a receiver until January 30, 1950 (Tr. 6108).

adapter and an itemized parts list therefor (Exhibit 296). Just prior to the demonstration on the record of the device, and after its disclosure, RCA objected. The objection, only part of which has been quoted by appellants (Br., p. 25) and which is set out in full in the margin,¹⁷⁰ was not to Mr.

¹⁷⁰ *Mr. McDaniel* [counsel for RCA]: Mr. Chairman, I understand that this development of Mr. Chapin's constitutes what might be considered an improvement in the particular system being proposed by CBS in these proceedings.

The Commission in this case is in a judicial capacity, I assume, because it may have to choose between contesting proponents here, and when the Commission comes forward with a development which seems to be an improvement in the system proposed by one of the litigants, it sounds a little bit like a person in a judicial capacity assisting one of the parties in the contest.

I just want to make that statement and say that we take exception to putting this development into these proceedings, because we think it is inconsistent with the judicial position which the Commission should take in the proceedings.

Mr. Salant [counsel for CBS]: Would you like a statement from me?

The Chairman: I think not, unless you feel called upon. I think I can take care of it myself.

Mr. Chapin, who is putting this in, and another employee of our Commission, have developed this and have filed for patents on the development. Mr. Chapin is the head of our laboratory, he is not a member of the Commission, and in no way in position to determine the vote of a single member of the Commission; nor is any other member of the staff of the Commission. The Commission is perfectly competent and has the ability to determine between contesting forces in these hearings, whether it is RCA, CBS, DuMont, CTI, or anyone else; and I want to say on the record that I resent the suggestion very much that the Commission is influenced in its determination by the work of a single member of its staff or all of its staff when it comes to making a decision on the record in these proceedings.

If there is anything else to be said on this, let's get it off our chest now.

Mr. McDaniel: Mr. Chairman, I have said all I think I need to say. There has been no development here by the Commission's engineering staff that I know of with reference to any other system. There are two other contestants in the case proposing color systems, and it is a matter of appearance more than anything else. We just think it is a little bit out of order.

The Chairman: Mr. McDaniel, you will recall that we have asked RCA for its equipment, so that we might have an opportunity to work on it. I suspect that some of our people have capa-

Chapin's continued participation in the proceeding, but was directed solely to "putting the development into these proceedings." RCA's counsel characterized his own objection as "a matter of appearance more than anything else" (Tr. 5982). The objection was overruled.

The foregoing circumstances establish that no error was committed by the Commission in permitting Chapin to participate in the proceedings. The appellants do not claim that Chapin's participation in the proceedings and the advice he gave the Commission in the course of his duties establish actual bias on the part of the Commission.¹⁷¹ They

bilities of effecting some improvement in that system and that we may, when and if we get hold of that equipment, file a patent on an improvement on that equipment for the benefit of the Government of the United States.

You will recall privately I have had something to say to you about equipment and have had some argument with you about whether it is proper for us to have the equipment. We have not yet received the equipment. When we receive the equipment, we will have the same opportunity to work on the equipment as we have on CBS equipment.

Mr. McDaniel: We will welcome that. We have a new system and not an old system, and as soon as we can get the equipment to you, we will.

The Chairman: Is there anybody else who has questions? I am perfectly willing to answer questions on this as Chairman of the Commission, and I do not feel any one of us considers it improper for us to have taken such action, and I want to add further, if you do not know it, that I have already signed the letters to patent the equipment that you are going to see. (Tr. 5980-5983)

¹⁷¹ Appellants seek to emphasize the importance of Chapin's asserted advice to the Commission by stating that five of the Commissioners are laymen, and one of the two remaining Commissioners, who is an engineer, dissented. Of course, other FCC staff engineers also participated in the proceedings and, in any event, as already noted, the Commission's findings on all matters (except in respect of whether the public would be satisfied with 12½ inch color pictures) were unanimous—concurred in by both Commissioners who were engineers. Further, it is to be noted that in respect of Commissioner Jones (who was one of the laymen who not only concurred with the majority but was of the opinion that the Commission should have adopted CBS standards immediately at the time of the First Report), General Sarnoff, Chairman of the

are concerned, they say, not with the fact of bias but with the "danger of wrong" (Reply to Motion to Affirm, p. 33), or as appellants put it before the Commission, "a matter of appearance more than anything else." And it is that plainly intangible and speculative factor which, they say, should now operate alone to destroy the product of nine months of hearings at which no objection to Chapin's participation was made.

It is conceded that Chapin had no financial interest in the automatic scanning adapter (Br., p. 142);¹⁷² the only charge appellants make in this respect is that somehow he "had an interest of professional prestige and reputation in the adoption of the CBS system" (Br., p. 142).¹⁷³ But since,

Board of appellant RCA, stated in the course of the hearing (Tr. 10581-2):

Well, I want to take this opportunity—I know you are not inviting it, and I am not lecturing you—but if you will permit me, I would like to say that having read the record of these proceedings, over 10 000 pages, I have been perfectly amazed at your grasp of the subject and I think you have made a contribution to the subject and to the development of the questions that have been before you. In fact, I did not expect any lawyer to know that much, technically.

(Laughter) •

Commissioner Jones: General, my hat is off to you. You disarm me."

¹⁷² On November 9, 1949, Chapin executed an assignment of his patent rights to the Government (R. 445).

¹⁷³ Appellants seek to show an indication of a "predisposition in favor of the CBS system" on the part of Chapin (Br., pp. 26, 143-144) by reference to Chapin's testimony concerning a comparison of the complexity and cost of RCA and CBS receivers. But not only did RCA take full advantage of its opportunity to cross-examine Chapin on this issue in an attempt to establish the assertedly erroneous basis of the comparison (Tr. 10626-36), but also the record shows that, quite properly, Chapin's comparison dealt, as it necessarily must have, not with recently developed RCA receivers which he had seen only momentarily at the time he had prepared his analysis, but with the receivers which RCA had initially submitted to the FCC laboratory for testing (Tr. 10627, 10629). As stated by the Chairman (Tr. 10634): "I should like to make the

as has been shown, the adapter could be used not only with the CBS but also the RCA system, that assertion must fail. In any event, Chapin's "professional prestige and reputation" could hardly be thought to be any more dependent on adoption of the CBS system than that of a judge who must retry a case after he has once been reversed and a new trial ordered. See *United States v. Morgan*, 313 U. S. 409, 421.

There being no showing of actual bias on Chapin's part, let alone the Commission's, appellants' belated objection to his participation must fail. For this Court has held that in circumstances such as these, nothing short of such showing will void an administrative order. Thus even the fact that the industry being regulated paid the salaries and expenses of agents of the regulatory agency has been held not to vitiate the agency's orders. *Champlin Rfg. Co. v. Commission*, 286 U. S. 210, 236. And the fact that an executive officer "not merely held, but expressed, strong views on matters believed by him to have been in issue" before him for decision "did not unfit him for exercising his duty in subsequent proceedings." *United States v. Morgan*, 313 U. S. 409, 421. Instead of permitting appellants' alleged vague apprehensions to upset the Commission's order and thus frustrate the statutory purpose in effectuation of which the order was issued, the assumption should be that announced by this Court: that commis-

point for the record here that Mr. Chapin's testimony was based upon the receivers which were available to the laboratory for test work and observation work there: "I do not want to have to review at this time, but I may, if necessary, the difficulties we have had in getting receivers from RCA for work at the laboratory" (see *supra*, note 170, p. 145).

Appellants are also mistaken in their assertion (Br., p. 142) that Chapin "supported an incompatible system." Appellants' supporting reference for their assertion is simply to a prior assertion to the same effect made by them in the court below. The fact is, as the administrative record shows, Chapin made no recommendations in the course of his testimony, but simply testified to various facts and opinions without supporting or opposing the adoption of standards for any system.

sioners chosen by the President and confirmed by the Senate "are assumed to be men of conscience and intellectual discipline, capable of judging a particular controversy fairly on the basis of its circumstances. Nothing in this record disturbs such an assumption." *Ibid.*¹⁷⁴

III.

THE DISTRICT COURT PROPERLY QUASHED THE SUBPOENAS DUCES TECUM ISSUED AT THE REQUEST OF PILOT RADIO CORPORATION.

Upon the motion of appellees, the District Court quashed two subpoenas *duces tecum* (R. 873-4 which had been issued at the request of appellant-intervenor Pilot Radio Corporation (hereinafter referred to as "Pilot") on

¹⁷⁴ In addition to the procedural issues raised by appellants and discussed herein, appellant-intervenor Local 1031, in its brief, also appears to suggest that the Commission's Notice instituting the color proceeding (R. 16; see *supra*, p. 5) varied so substantially from the ultimate order that the latter is thereby invalid. The contention is wholly without foundation. Section 15(a) of the Commission's Notice (R. 22-23) invited proposals for changes in engineering standards looking toward the adoption of a color system; Appendix A, Paragraph IIC of the Notice (R. 26) specified the conditions which any color system must meet. These conditions were that the system operate in a 6 mc. channel, and that "existing television receivers designed to receive television programs transmitted in accordance with present transmission standards will be able to receive television programs in accordance with the proposed new standards simply by making relatively minor modifications in such existing receivers." Pursuant to this Notice, and before the hearing, CBS, among others, filed its proposals, setting forth in full the details of its system.

Local 1031 apparently contends that the CBS system adopted by the Commission does not meet the requirement of the Notice since more than "relatively minor modifications" are required to adapt and convert existing sets. Its argument is based on purported facts which are wholly outside the record. The Commission itself explicitly found, on evidence in the record, that the CBS system is adaptable and convertible within the meaning of the Notice (First Report, Pars. 105, 106; Second Report, Par. 10; see *supra*, pp. 19-20). Hence it is clear that there is no variance between the Notice and the Order.

November 8, 1950, directing the Commission and CBS, respectively, to produce at the hearing copies of all written communications relating to color television between them and United States Senator Edwin C. Johnson, Chairman, Senate Interstate and Foreign Commerce Committee. The material sought, most of which consisted of an exchange of correspondence between Senator Johnson and the Commission, or members thereof, and between Senator Johnson and officials of CBS, was lodged with the District Court (R. 873). Pilot purported to introduce this material, together with an exchange of telegrams between Senator Johnson and Pilot, in order to show that the Commission's decision was the result of improper pressure exerted by Senator Johnson.

The action of the court below in quashing these subpoenas was clearly correct.

The material sought by Pilot was totally irrelevant to the proceedings below. There is no allegation in either Pilot's complaint (R. 451) or its motion to intervene as plaintiff (R. 450) which raised an issue upon which the requested material had any bearing whatever. As the court below stated in its opinion (R. 874), "... neither Pilot nor any other intervenor nor plaintiffs make any charge or allegation in their pleadings that the Commission in making its order was influenced, cajoled or coerced by Senator Johnson or anybody else." The request for these subpoenas was therefore a bald attempt to swerve the proceedings below from their orderly course by the injection of clearly irrelevant charges.

Even if the issue had been raised by the pleadings, the quashing of the subpoenas would have been proper. For it is well settled that in the absence of a substantial showing of improper conduct which would vitiate the proceedings, the court will not go behind the record to probe into the mental processes by which an administrative determination is made. *United States v. Morgan*, 313 U. S. 409, 421-2; *Chicago B. & Q. Ry. Co. v. Babcock*, 204 U. S. 585,

593. *Cf. Berkshire Employees Association v. National Labor Relations Board*, 121 F.2d 235 (C. A. 3).

It is clear, in any event, that the material sought to be introduced by Pilot wholly fails to reveal any improper actions by Senator Johnson which would vitiate the Commission's proceedings. The charges made by Pilot constituted an irresponsible and unsupported reflection on the integrity of both Senator Johnson and the members of the Federal Communications Commission. As the correspondence shows, Senator Johnson, as Chairman of the Senate Committee on Interstate and Foreign Commerce, displayed an affirmative interest, entirely consonant with his official position, in the Commission's progress with respect to color television. The attack upon Senator Johnson's concern with the Commission's functions, which, as the material establishes, was in no way directed toward influencing the course of decision, was indeed an attack upon the legitimate functions of Congressional committees in their relationship to administrative agencies which the Congress has established to administer the laws which it has enacted.

The circumstances, accordingly, establish that the court below was clearly correct in quashing the subpoenas sought by Pilot.

CONCLUSION.

For the foregoing reasons, the judgment of the court below should be affirmed.

Respectfully submitted,

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APPENDIX A.

Communications Act of 1934, 48 Stat. 1064, as amended, 47 U. S. C. 151, *et seq.*

Sec. 4(i). The Commission may perform any and all acts, make such rules and regulations, and issue such orders, not inconsistent with this Act, as may be necessary in the execution of its functions.

Sec. 301. It is the purpose of this Act, among other things, to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. No person shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any Territory or possession of the United States or in the District of Columbia to another place in the same Territory, possession, or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or possession of the United States; or (c) from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel or aircraft of the United States; or (f) upon any other mobile stations within the jurisdiction of the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

Sec. 303. Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires, shall—

(b) Prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class;

(c) Assign bands of frequencies to the various classes of stations, and assign frequencies for each individual station and determine the power which each station shall use and the time during which it may operate;

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act: *Provided, however,* That changes in the frequencies, authorized power, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, after a public hearing, the Commission shall determine that such changes will promote public convenience or interest or will serve public necessity; or the provisions of this Act will be more fully complied with;

(g) Study new uses for radio, provide for experimental uses of frequencies; and generally encourage the larger and more effective use of radio in the public interest;

(r) Make such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this Act, or any international radio or wire communications treaty or convention, or regulations annexed thereto, including any treaty or convention insofar as it relates to the use of radio, to which the United States is or may hereafter become a party.

Administrative Procedure Act, 60 Stat. 237, 5 U. S. C.
1001, *et seq.*

RULE MAKING.

Sec. 4(b) Procedures.—After notice required by this section, the agency shall afford interested persons an oppor-

tunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity to present the same orally in any manner; and, after consideration of all relevant matter presented, the agency shall incorporate in any rules adopted a concise general statement of their basis and purpose. Where rules are required by statute to be made on the record after opportunity for an agency hearing, the requirements of sections 7 and 8 shall apply in place of the provisions of this subsection.

JUDICIAL REVIEW.

Sec. 10. Except so far as (1) statutes preclude judicial review or (2) agency action is by law committed to agency discretion—

(e) Scope of review.—So far as necessary to decision and where presented the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of any agency action. It shall (A) compel agency action unlawfully withheld or unreasonably delayed; and (B) hold unlawful and set aside agency action, findings, and conclusions found to be (1) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law; (2) contrary to constitutional right, power, privilege, or immunity; (3) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right; (4) without observance of procedure required by law; (5) unsupported by substantial evidence in any case subject to the requirements of sections 7 and 8 or otherwise reviewed on the record of an agency hearing provided by statute; or (6) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court. In making the foregoing determinations the court shall review the whole record or such portions thereof as may be cited by any party, and due account shall be taken of the rule of prejudicial error.

APPENDIX B.

Tabular Comparison of CBS and RCA Systems as Found by the Commission.

(Paragraph numbers refer to First Report)

I. Characteristics.

<i>Subject</i>	<i>CBS</i>	<i>RCA</i>
Color fidelity	Most satisfactory—entirely suitable for home viewing purposes (par. 140) Uniformly high quality (par. 86)	Not satisfactory—no reasonable prospect that defects can be overcome, because of misregistration, mixed highs, cross-talk between picture elements and criticalness of color control implicit where a time error of 1/11 millionth of a second results in color contamination (par. 132)
Texture	Most satisfactory—(par. 140)	Not satisfactory—misregistration—"soft" quality—poorness of contrast all of which seem difficult to eliminate (par. 133)
Studio camera	Simple to handle, not expensive; able to operate in widely diversified circumstances (par. 141)	Exceedingly complex, very difficult to maintain in precise operating condition, necessary for staff of trained personnel to handle (par. 135)
Field camera	Successful demonstrations (par. 140)	None built, none demonstrated (par. 135)
Transmission of color on network	Can transmit color on 2.7 mc. coaxial cable (par. 114)	No adequate assurance that color pictures can be transmitted on 2.7 mc. coaxial cable, par. 137)

Subject	CBS	RCA
Color transmission systems	Relatively simple, relatively slow switching rate of 144 times per second (par. 112)	Complex—switching rate of 11,000,000 per second. Much more susceptible to oscillator radiation interference than black-and-white or CBS system (par. 134)
TV color home receiver	Relatively simple, color control quite simple and not at all critical; cheap enough to be available to the great mass of the American purchasing public (par. 112)	No demonstrations on the record of a practical RCA home receiver. Too bulky, complex and expensive to be seriously considered for home use. Controls so critical that even trained technicians unable to maintain color fidelity through one single demonstration (par. 134 and par. 115)
Picture-size limit	Direct view 12½ inches maximum, 16 inches with magnification. If tri-color tube is perfected, size will be unlimited	None stated (par. 144)
Tri-color tube, if perfected	Witnesses agree that it will work on CBS system, and will eliminate color wheel; quality of picture will be determined by quality of tri-color tube (par. 144)	Will work, but will not eliminate registration, fidelity or other problems, which are possibly inherent in the complex RCA system (pars. 116 and 134)

II. Effect of Color Transmissions on Present Black-and-White TV Sets.

<i>Subject</i>	<i>CBS</i>	<i>RCA</i>
To get black-and-white on existing set from color transmission	Need adapter (par. 105)	Can receive black-and-white without adapter (par. 107)
Quality of black-and-white reception	Some loss of resolution, but still an acceptable picture (par. 143)	Picture somewhat inferior to present black-and-white (par. 107)
To get color on existing sets	Need adapter (built in or added) plus converter (color wheel) (par. 105)	Need converter (no converter built or demonstrated) (par. 107)

III. Cost to TV Set Owner.

<i>Subject</i>	<i>CBS</i>	<i>RCA</i>
Adapter (internal)	"Substantially lower" than external adapter (par. 105)	None (par. 107)
External adapter	\$32-\$50 plus installation (par. 105)	None (par. 107)
Converter	\$95-\$170 (par. 106)	Unknown—none ever built and no costs estimated (par. 107)
Tri-color tube receiver, if perfected	See RCA column	RCA testified that tube twice cost of black-and-white tube (par. 134). No assurance that tube will not be unduly expensive (par. 134)
Color receiver (not using tri-color tube)	\$200-\$300. Should be within the economic reach of the great mass of the purchasing public (par. 141)	\$550 to \$1,000. So expensive that it is inconceivable the public would purchase in quantity (par. 134)